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BRITISH COLUMBIA

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APPENDIX - ECONOMIC IMPACT STUDY

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ECONOMIC IMPACTS AND PROSPECTS OF THE SALMON FARMING AND WILD SALMON INDUSTRIES IN BRITISH COLUMBIA

Submitted to:

Special Committee on Sustainable Aquaculture
Legislative Assembly
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Victoria, BC V8V 1X4

Subcommittee
- Robin Austin, MLA (Chair)
- Ron Cantelon, MLA (Deputy Chair)
- Claire Trevena, MLA
- Committee Clerk: Craig James

May, 2007

Prepared by:

MMK Consulting Inc.
- Stuart MacKay
- Fiona Petersen
- Angela Rey

In association with

Golder Associates

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Executive Summary

This report assesses the economic impacts and prospects of the salmon farming and wild salmon industries of British Columbia. It has been performed by MMK Consulting, on behalf of the BC Legislative Assembly's Special Committee on Sustainable Aquaculture.

1. Direct economic impacts

The direct economic impacts of salmon-based industry activities in 2005 are summarized in Exhibit ES-1.

Exhibit ES-1 — Direct economic impacts

The **salmon farming** sector, including both aquaculture production and processing activities, accounted for $371 million in direct output and contributed $134 million to provincial GDP in 2005. The industry also provided an estimated 1,500 full-time equivalent jobs.

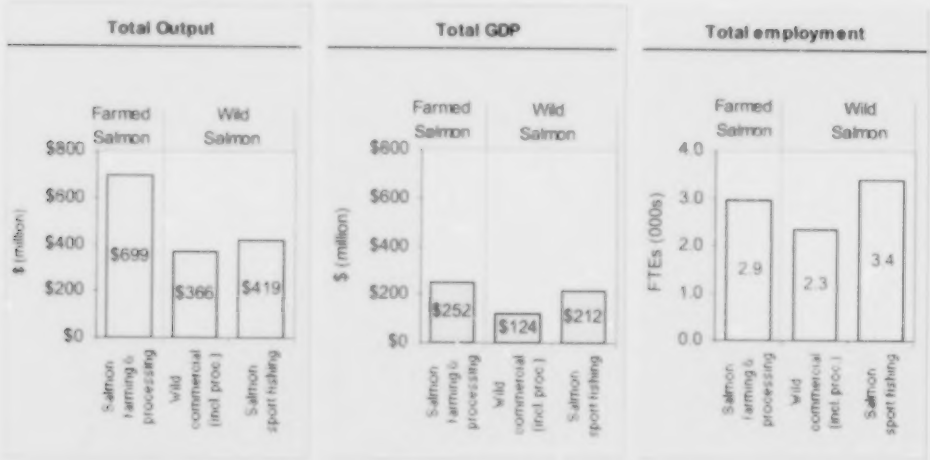
The **wild commercial salmon** sector, including both capture and processing activities, accounted for $216 million in direct output and $67 million in GDP. Salmon harvesting and salmon processing activities provided approximately 1,600 full-time equivalent jobs, mostly in processing. (In addition to processing BC-caught salmon, BC companies also process significant volumes of Alaska-caught salmon, accounting for $37 million (48%) of the value of salmon canned in BC in 2005.)

The **salmon sport fishing** sector accounted for approximately $231 million in output and contributed $116 million to provincial GDP, providing 2,280 full-time equivalent jobs.

2. Direct, indirect and induced impacts

Exhibit ES-2 illustrates the estimated indirect and induced impacts associated with each sector[1].

Exhibit ES-2 — Direct, indirect and induced benefits



Multipliers effects are significant for all the industry sectors. They tend to be strongest in the salmon farming industry, especially with respect to indirect employment generated by service providers to this industry. Average value added (GDP) per FTE is highest for the salmon farming industry ($86,000), followed by salmon sport fishing ($62,000) and wild commercial salmon ($53,000).

3. Economic Trends

Economic trends in recent years have differed greatly among sectors:

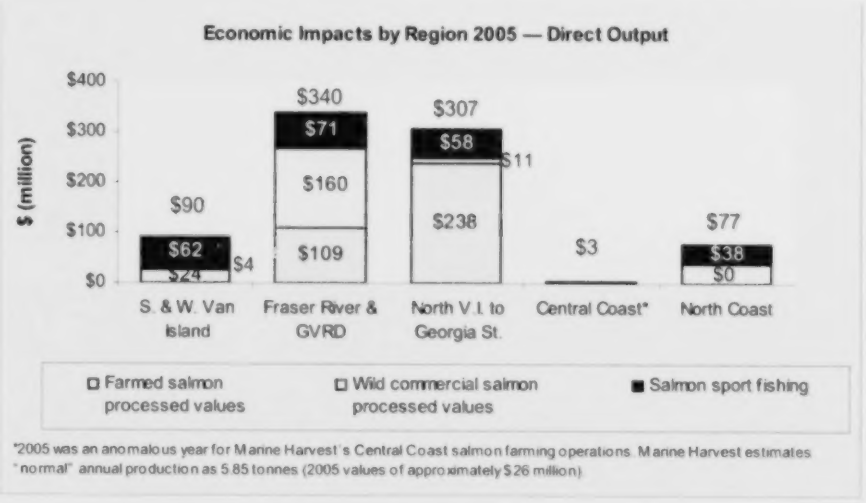
- The **salmon farming** industry nearly doubled its size between 1997 and 2005, both in terms of production volumes and output value. Preliminary figures for 2006 indicate a more than 15% increase in production volumes over 2005.
- The size of the **wild commercial salmon** industry declined significantly between 1997 and 2005, with total output values decreasing by more than 30%.
- For the **salmon sport fishing** sector, economic indicators show an overall decline in fishing activity since 1997. However, the overall indicators also mask very different regional trends:
  - Angler boat-trips in Georgia Strait declined by 68%, partly offset by increased angling activity in the Fraser River.
  - Activity levels and catches were significantly up on the West Coast of Vancouver Island, and in the North/Central Coast.

[1] These figures are generally based on BC Input Output Model (BCIOM) multipliers, adjusted to reflect the specific objectives and scope of this study. See full report for details.

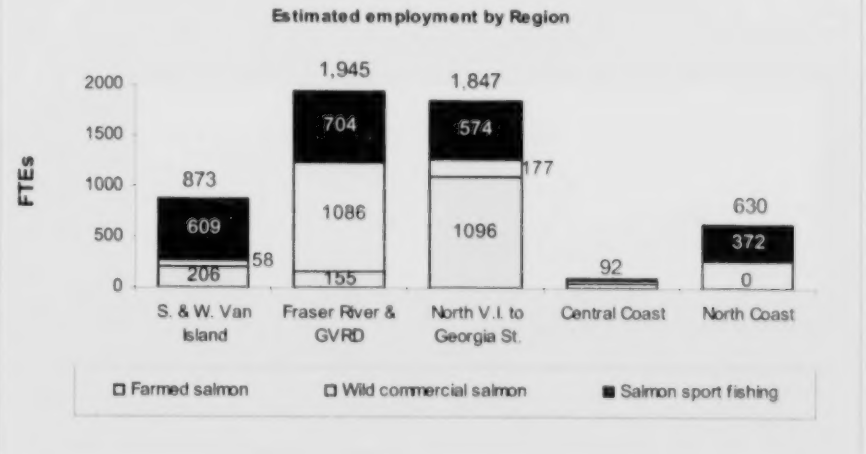
4. Regional analysis

As illustrated in Exhibit ES-3, the relative economic importance of the salmon-based industries varies by region[1].

Exhibit ES-3 — Regional results for total output and total employment



*2005 was an anomalous year for Marine Harvest's Central Coast salmon farming operations. Marine Harvest estimates "normal" annual production as 5.85 tonnes (2005 values of approximately $26 million).



[1] Regions are defined as follows:
Region #1 - South and West Vancouver Island: includes Alberni-Clayquot and Capital Regional Districts.
Region #2 - Fraser River & GVRD: includes Greater Vancouver and Fraser Valley Regional Districts.
Region #3 - North Vancouver Island to Georgia Strait: includes Sunshine Coast, Powell River, Comox-Strathcona, Nanaimo, and Mt. Waddington Regional Districts.
Region #4 - Central Coast: includes Kitimat-Stikine and Central Coast Regional Districts.
Region #5 - North Coast: includes Skeena-Queen Charlotte Regional Districts.

Salmon farming is heavily concentrated in Region 3. Significant salmon farming aquaculture operations also exist in Region 1, and significant processing operations exist in Region 2.

Wild commercial salmon fishing operations are most significant in Regions 2, 3 and 5. Processing operations are located primarily in Regions 2 and 5.

Sport salmon fishing represents a relatively significant share of the salmon-based economy in all regions. While activity levels have declined in the Strait of Georgia in recent years, sport fishing still represents a significant share of salmon-related economic activity in Regions 1 and 2.

5. Other salmon-related industries and sectors

A number of other BC tourism-related industry segments also have an economic interest in the ongoing health of wild salmon stocks. These segments include marine wildlife viewing, ocean kayaking, boat charters, scuba diving, sail cruising, pocket cruising, and freshwater fishing. Based on a previous industry study, the total direct revenues for these other segments in 2001 is estimated as approximately $214 million.

6. Economic prospects

Economic prospects for each industry are illustrated in Exhibit ES-5.

For **salmon farming**, the industry's economic prospects are assessed as strong in the short to medium term. In the longer term, the industry's success will be determined by the growth of North American demand, international competition (particularly from Chilean farmed salmon), and the industry's ability to expand production levels.

For **wild commercial salmon**, the industry's economic prospects depend on future access to salmon (allowable catches), market price trends, development of niche markets, and further industry rationalization and restructuring.

For **salmon sport fishing**, the industry's economic prospects will depend on the quality of the opportunity for sport fishing. If current trends continue, activity levels and expenditures will likely continue to decline in Georgia Strait while growing in other regions.

Exhibit ES-5 — Economic prospects

	Salmon farming	Wild commercial salmon	Salmon sport fishing
Barriers/ threats to growth	• Environmental impact concerns • New site availability • First Nations issues • Regulations on current operations • International ownership and competition for new investment • Market competition and price fluctuations • Changing consumer demographics and product preferences	• Precautionary resource management • Reduced access to chinook/coho • Environmental risks to wild stocks • Market competition from farmed salmon • Capture overcapacity and unprofitability • Consistency of product, price levels • Competition from Alaska canneries • Competition for Alaska salmon from Chinese processors	• Environmental threats to wild stocks • Poor fishing in Georgia Strait • Future quality of fishing in other areas
Opportunities for growth	• Strong prices in US fresh market • Improving production yields • Partnering with wild salmon distributors	• Increased harvest levels • Further industry restructuring • Improved product quality and consistency • Premium-price niche markets	• Good salmon fishing outside Georgia Strait • Growth in other salmon-related tourism • Possible partial recovery in Georgia Strait
Assessment of Prospects	• Very strong in short to medium term • Long term depends on ability to expand production	• Weak in the short to medium term • Long term depends on industry restructuring	• Poor in Georgia Strait, strong elsewhere

INTRODUCTION

1. Introduction

On behalf of the Legislative Assembly of British Columbia's Special Committee on Sustainable Aquaculture ("Special Committee"), MMK Consulting has assessed the economic impacts and prospects of the salmon farming and wild salmon industries in British Columbia (BC). This study has been performed in support of the Special Committee's wider mandate to examine:

- The economic and environmental impacts of the aquaculture industry in BC.
- The economic impact of aquaculture on BC's coastal and isolated communities.
- Sustainable options for aquaculture in BC that balance economic goals with environmental imperatives, focusing on the interaction between aquaculture, wild fish and the marine environment.
- BC's regulatory regime as it compares to other jurisdictions.

1.1 Study objectives

The *primary* objectives of this study are to perform:

- An economic analysis of the salmon farming industry in British Columbia.
- An economic analysis of the BC wild salmon industries, including:
  - The wild commercial salmon fishing industry
  - The sport fishery industry.

The study's two *secondary* objectives are to perform:

- An economic analysis of other industries impacted by each of the salmon industry sectors.
- An assessment of the economic impacts of the aquaculture industry on the industries reliant on wild salmon.

1.2 Study conduct

In performing this study we have:

- Reviewed previous relevant economic studies, utilizing existing data where possible.
- Performed personal and telephone interviews with industry participants and observers:
  - To collect and validate statistical information.
  - To develop additional information on the interdependencies among the sectors.

- Developed estimates (working with the BC Input/Output Model) of overall expenditures and economic activities for each industry sector, both overall and broken out by geographic region, including:
  - Total output.
  - Gross domestic product (GDP).
  - Employment and employment income.
  - Direct, indirect and induced impacts.
  - Historical trends.
- Assessed each industry's future potential to generate tax revenue and create jobs, based on global markets and competition, existing regulatory limits, and social and environmental constraints to industry growth.

1.3 Layout of report

This report consists of four main parts:

- Part I presents economic profiles of various industry sectors (Chapters 2-6), and provides estimates of BC-wide economic impacts in Chapter 7.
- Part II assesses the relative levels of each sector's economic activity in five BC regions (Chapters 8-12), and summarizes the results (Chapter 13).
- Part III (Chapter 14) assesses the economic impacts and interdependencies of the salmon farming industry on other salmon-reliant and salmon-related industries.
- Part IV (Chapter 15) briefly assesses the opportunities, barriers and overall economic prospects of each industry.

PART I

ECONOMIC PROFILES OF EACH SECTOR

- **Chapter 2: Overview of BC Salmon Industry**
- **Chapter 3: BC Salmon Farming Industry**
- **Chapter 4: Wild Salmon Commercial Fishing**
- **Chapter 5: Salmon Sport (Recreational) Fishing**
- **Chapter 6: Salmon Processors and Distributors**
- **Chapter 7: Economic Impacts of Each Sector**

2. Overview of BC Salmon Industry

The BC salmon industry includes three major sectors:

- Salmon aquaculture (salmon farming) and processing.
- Wild commercial salmon fishing and processing.
- Salmon sport fishing.

Salmon processing (for farmed and wild salmon) is also often analyzed as a separate fourth industry sector. For this study, we have treated these operations as part of the salmon farming and salmon commercial sectors[1].

In addition, a number of other tourism-oriented industries have an economic interest in the ongoing health of wild salmon stocks. These are discussed in Chapter 14.

The scope of this study does not include the socio-economic aspects of salmon in First Nations communities.

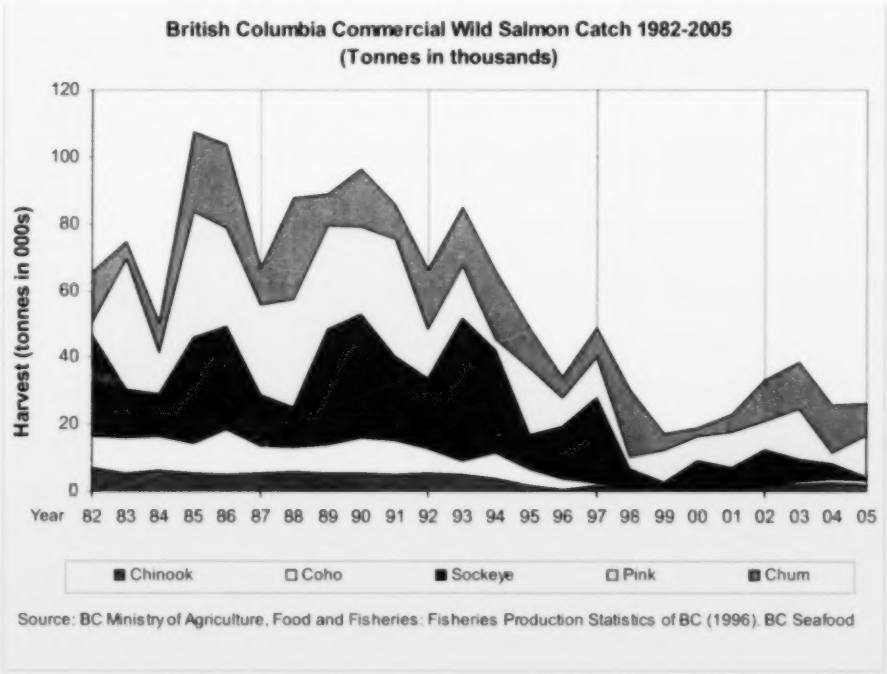
[1] A limited number of processing operations handle both farmed and wild salmon, and in these cases we have apportioned economic activities based on relevant volumes handled.

2.1 Historical trends of commercial and aquaculture salmon fisheries

2.1.1 Wild salmon harvesting trends

The BC commercial salmon industry involved mostly wild salmon capture and processing until the early 1980s. As illustrated in Exhibit 2a, over the past two decades, the wild salmon harvest has experienced wide fluctuations, due to a combination of natural conditions and Department of Fisheries and Oceans (DFO) management practices.

Exhibit 2a — BC commercial wild salmon catch (tonnes 000s) —1985-2005



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996), BC Seafood

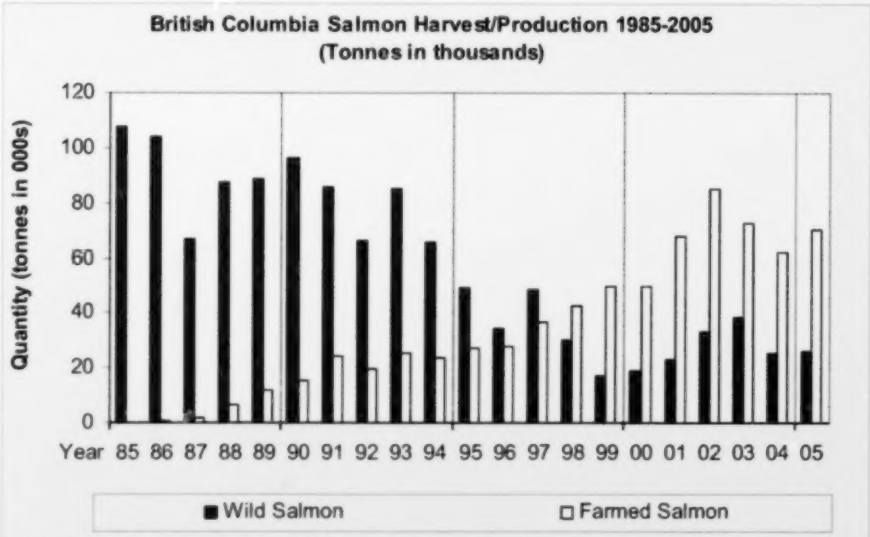
In the late 1990s, in response to concerns about declining wild salmon stocks, DFO implemented stricter conservation programs, and introduced a number of initiatives to reduce the number of salmon fishing licences and limit annual catches. In addition, the recreational fishing sector was given priority access to chinook ("spring") and coho species starting in 1999, resulting in decreased volumes of these species for the commercial fishery.

2.1.2 Farmed salmon volume trends

Over the same period, BC salmon farming production rose substantially, overtaking the wild salmon harvest, as illustrated in Exhibit 2b. By 2005, aquaculture

production amounted to 70,600 tonnes, or 73% of BC's combined harvest of wild and farmed salmon. Wild salmon capture was 26,000 tonnes, or 27% of the combined harvest volume.

Exhibit 2b — Harvest/production of BC wild and farmed salmon (tonnes 000s) — 1985-2005



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004, 2005).

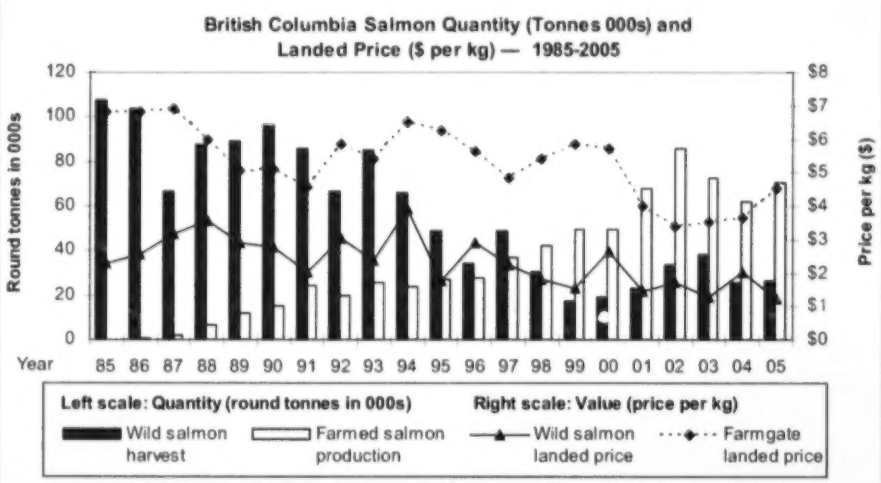
2.1.3 Salmon price and revenue trends

As the production of farmed salmon continued to rise in the early 2000s, both in BC and globally, the price of wild and farmed salmon fell. As illustrated in Exhibit 2c, the average landed price in 2005 was $1.30 per kg for wild salmon and $4.50 per kg for farmed salmon[1].

Aquaculture production represented 73% of the total BC harvest volume in 2005, and accounted for 91% of its total landed value.

[1] The unit price of farmed salmon is considerably higher than for wild salmon, as most of farmed salmon is sold as fresh dressed, whereas most wild salmon is either frozen or canned, and includes a high proportion of lower value chum and pink salmon.

Exhibit 2c — Quantity and average landed[1] value of wild and farmed salmon 1985 - 2005



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004, 2005).

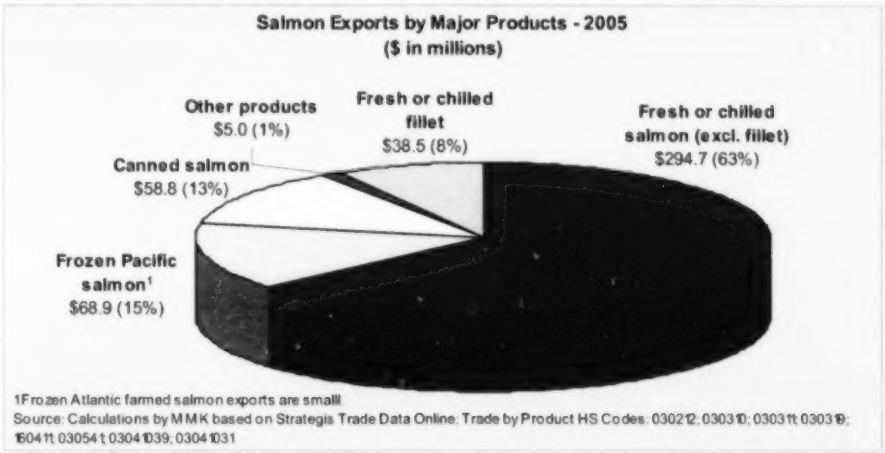
1 The landed value is the price paid to commercial fishers and/or aquaculture for the whole fish. In aquaculture this can also be referred to as farmgate value.

2.2 BC salmon exports

2.2.1 BC salmon export values

BC salmon exports represented a total value of $427.4 million in 2005. As presented in Exhibit 2d, fresh or chilled salmon (mostly US-destined farmed salmon) is the largest export, representing $294.7 million or 63% of total exports. Frozen Pacific salmon is second with $68.9 million (15%), followed by canned salmon at $58.8 million (13%), and fresh fillet at $38.5 million (8%). Other products, including smoked salmon, roes, etc. represent $5.0 million or 1% of total exports.

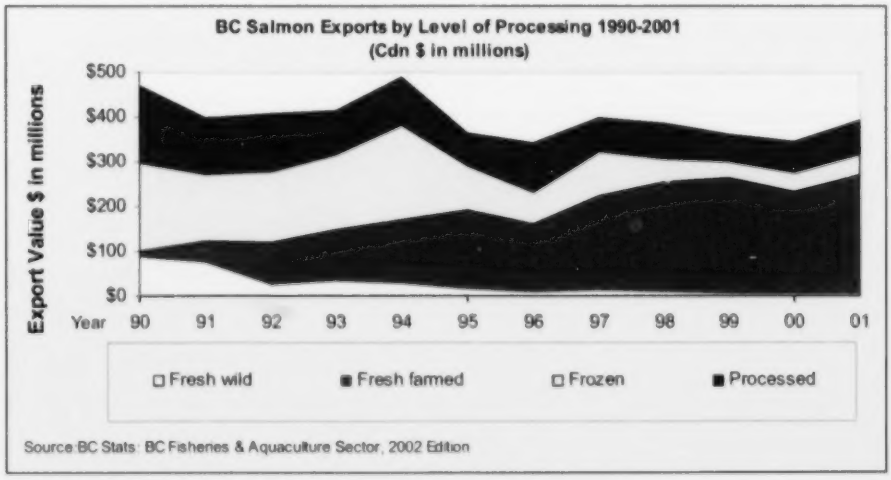
Exhibit 2d
BC salmon exports by major products – 2005



1Frozen Atlantic farmed salmon exports are small.
Source: Calculations by MMK based on Strategis Trade Data Online: Trade by Product HS Codes: 030212; 030310; 030311; 030319; 160411; 030541; 0304039; 0304031

As illustrated in Exhibit 2e, the nature of BC salmon exports has changed dramatically, as fresh farmed salmon exports (mainly to US markets) have displaced fresh/frozen wild salmon exports.

Exhibit 2e
BC salmon exports by level of processing 1990-2001 ($ in millions)



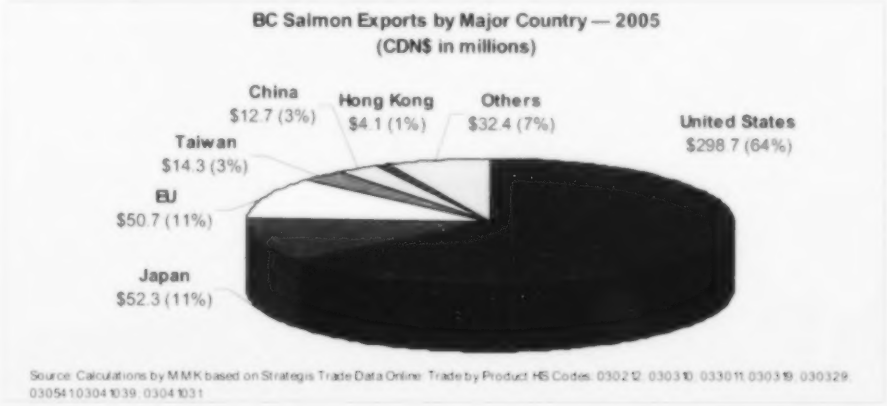
Source: BC Stats: BC Fisheries & Aquaculture Sector, 2002 Edition

The Japanese economic slowdown and its slow recovery has affected all BC salmon exports over recent years. Rising farmed salmon production world-wide (especially in Chile), coupled with a weakening Japanese market demand, has put downward pressure on prices.

2.2.2 BC salmon export markets

As illustrated in Exhibit 2f, the US is the largest export market for BC salmon products, accounting for 64% of total BC export values in 2005. It is followed by Japan and the EU (11% each).

Exhibit 2f
BC salmon exports by major country ($ in millions)



Source: Calculations by MMK based on Strategis Trade Data Online. Trade by Product HS Codes: 030212, 030310, 030311, 030319, 030329, 0305410304 1039, 0304 1031

Different export markets for BC salmon demand different type of products, as illustrated in Exhibit 2g:

- **Fresh salmon** — The United States is the major market for fresh dressed salmon (mostly farmed salmon), accounting for $245.5 million or 83% of total fresh and/or chilled salmon exports in 2005. Japan is the second largest export market, accounting for $26.2 million. Fresh salmon exports represent approximately 70% of total salmon exports.

- **Frozen salmon** — Japan has traditionally been the largest export market for frozen salmon and frozen roe (mostly wild salmon roe). In recent years however, Japan exports have fallen, and in 2005 frozen salmon exports to the US ($12.9 million) exceeded those to Japan ($10.8 million). At the same time, the Chinese export market grew from an average of $1.3 million from 2000 to 2004, to $9.4 million in 2005.

- **Canned salmon** — The major market for canned salmon is the UK, with exports of $28.9 million in 2005 or 49% of this product export. Canned salmon is produced with both domestic (52%[1] in 2005) and imported salmon. Approximately 75% of canned salmon production consists of commercially captured pink salmon.

[1] Ministry of Agriculture and Lands - Fisheries Statistics: Canned salmon pack Bulletin 2005 (www.agf.gov.bc.ca/fish_stats)

Exhibit 2g
Value of BC salmon exports by major country and major product type (CDN $ in millions)

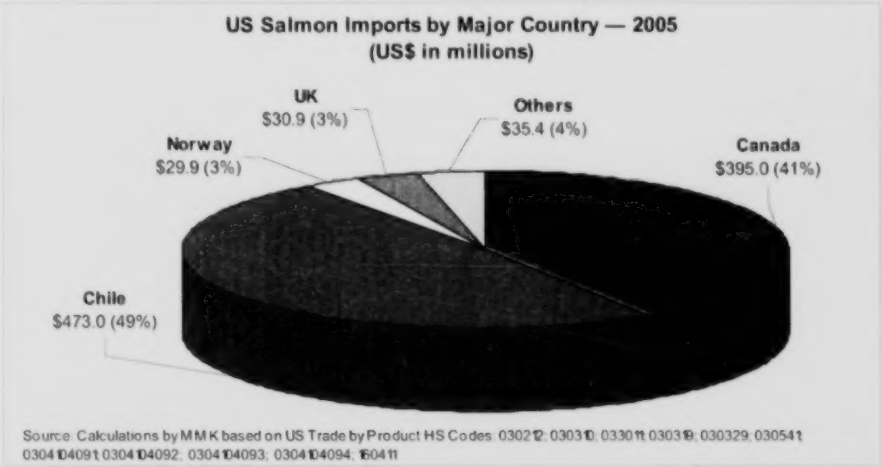
	5-year average exports			2005 exports	
	1990 to 1994	1995 to 1999	2000 to 2004	Export value	% of product exports
Fresh or chilled salmon					
• US	$128.6	$205.9	$240.1	$245.5	83.3%
• Japan	2.5	5.3	7.7	26.2	8.9%
• Taiwan	0.0	4.6	7.2	13.7	4.6%
• Other countries	0.2	1.6	2.8	9.2	3.1%
Total	$131.3	$217.5	$257.7	$294.7	100.0%
Frozen Pacific salmon					
• US	$ 19.0	$ 7.7	$ 8.7	$12.9	18.8%
• Japan	123.6	47.3	24.1	10.8	15.7%
• China	0.0	0.3	1.3	9.4	13.7%
• Other countries	29.4	7.9	12.7	35.7	51.9%
Total	$172.0	$63.3	$46.8	$68.9	100.0%
Canned salmon					
• UK	$68.2	$54.3	$38.2	$28.9	49.2%
• Australia	18.3	11.1	10.9	12.2	20.8%
• New Zealand	6.3	5.8	5.4	4.5	7.7%
• Other countries	20.8	19.0	14.5	13.2	22.4%
Total	$113.7	$90.1	$69.0	$58.8	100.0%

Source: Calculations by MMK based on Strategis Trade Data Online: Trade by Product HS Codes: 030212; 030310; 030311; 030319; 160411; 030541

2.2.3 US salmon imports

Chile and Canada hold 90% of the US salmon import market, as illustrated in Exhibit 2h. Chile is the number one exporter to the US, accounting for 49% of US salmon imports, and Canada is second with a share of 41%.

Exhibit 2h
US salmon imports — 2005



British Columbia is the leading exporter of whole fresh salmon to the US, with approximately 60%[1] of this specialty market. Most of the balance is supplied by Atlantic Canada to eastern US markets.

2.3 Salmon sport fishing

In terms of salmon caught, the recreational salmon fishery is small in comparison to the commercial fishery, representing approximately 3%[2] of total salmon capture in BC. However, as DFO has assigned priority to recreational anglers (over commercial fisheries) to chinook and coho since 1999, the recreational fishery takes a more significant share of the overall catch of these two species. As illustrated in Exhibit 2i, recreational anglers accounted for almost half of the total coho and chinook catches in 2001-2004.

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[1] MMK estimates based on US and Canada Trade data.

[2] Source: Report to the Pacific Fisheries Resource Conservation Council, June 2006: The Evolution of Recreational Salmon Fisheries in British Columbia. G. Kristianson and D. Strongitharm.

Exhibit 2i
Commercial and recreational harvest of coho and chinook
(Number of fish in 000s)

	Four-year average[1]			
	1991-1994		2001-2004	
	Catch	% of total catch	Catch	% of total catch
Coho				
Commercial	2,730.5	83.5%	177.3	55.4%
Recreational	539.3	16.5%	142.6	44.6%
Total	3,269.8	100.0%	319.9	100.0%
Chinook				
Commercial	593.8	75.0%	261.6	59.1%
Recreational	198.4	25.0%	180.8	40.9%
Total	792.2	100.0%	442.4	100.0%

1 Used four-year average to correspond to salmon four-year cycle.

Sources: DFO recreational fishing statistics; Evolution of Recreational Salmon Fisheries in BC, June 2006 by Sport Fishing Institute.

Exhibit 2i also illustrates the drop in the total catch (commercial and recreational) of coho and chinook between 1991-94 and 2001-04.

Coho dropped from a four-year average of 3.27 million fish in 1991-94 to 319,900 in 2001-04, and chinook fell from 792,140 to 442,360 over the same period. Recreational catches, while dropping in absolute terms, rose as a percentage of total catch.

Catch levels can vary greatly from one year to another, as annual catch is based on "overall abundance" as defined each year by DFO.

3. BC Salmon Farming Industry

3.1 Industry overview

Salmon farming in British Columbia has grown dramatically in the last two decades, reaching 70,600 tonnes in 2005 and 83,000 tonnes (preliminary estimate) in 2006.

Salmon farming began in the 1970's and early 1980's, with a few local small farm sites located primarily along the Sunshine Coast, producing mostly coho and chinook. In the late 1980s, some large international corporations bought out several local farms and started farming Atlantic salmon, which is considered to be better suited to farming because of faster growth and higher survival rates. By 1995, fish farming production had increased to 27,000 tonnes, with Atlantic salmon accounting for 67% of total production.

In 1995, the provincial government placed a moratorium on new fish farm licences and conducted an environmental impact assessment review. However, as operators were gaining experience in BC waters, they were able to reduce operating costs and increase production per site, thereby increasing farmed salmon production even during the moratorium. In 2002, the moratorium was lifted, and by 2005 there were 125 farming licences owned by 15 operators.

Between 2005 and 2007, BC's salmon aquaculture industry has been consolidated into a few major international players. These vertically integrated companies have facilities all over the world. They operate fish and seafood aquaculture farms and produce other seafood-related products such as smolt, fishmeal, etc.

Exhibit 3a presents a profile of the structure of the BC salmon farming industry in early 2007. With Panfish's purchase of Marine Harvest in 2006, Panfish holds 70 licensed tenures, representing 56% of the total number of BC licences. Through this latest merger, Panfish becomes the largest producer of farmed salmon and controls approximately 20%[1] of the world's salmon production.

Other significant companies include Mainstream Canada (29 tenures) and Grieg Seafood (13 tenures).

[1] PanFish news release: Pan Fish acquires Marine Harvest to form the world's largest fish farming company, June 2006.

Exhibit 3a
Profile of salmon farming industry companies

Company - Association with License Holders	Owner-ship	Tenures	% of BC salmon farm tenures	Employ-ment	Fish processing companies	Production (Tonnes 000s)	Approx value ($ in million)	Other Production Countries
Pan Fish	Norway	25	20.0%	200	Alpha Proc	12	not avail.	Norway
Marine Harvest Canada				140			$80	Chile, UK,
Stolt Sea Farms		27	21.6%		Englewood Proc			Ireland,
Nutreco Canada Inc		18	14.4%		Englewood Proc			Faeroe Islands
		70	56.0%					
Mainstream Canada	Norway (Cermaq)			130-200	Brown's Bay	21	$72	Chile,
1331735 Ontario Limited		14	11.2%					Norway ,
Ewos Aquaculture Ltd		12	9.6%					Scotland
Ewos Site Co. Ltd		2	1.6%					
Connors Bros. Limited		1	0.8%					
		29	23.2%					
Grieg Seafood BC Ltd	Norway	5	4.0%	n/a	Walcan Seafoods	Not avail		Norway,
Target Marine Products		5	4.0%		Target Marine			UK
Hardy Sea Farms Inc		3	2.4%					
		13	10.4%					
Creative Seafoods				39	Aquatic Seafoods	18	$15	n/a
Tofino Aquafarms Ltd		1	0.8%					
Creative Salmon Company Ltd		5	4.0%		Lions Gate Fisheries			
		6	4.8%					
Independents								
Middle Bay Partnership		1	0.8%					
S.K.M. Enterprises Ltd.		1	0.8%					
Omega Pacific Seafarms Inc		1	0.8%					
Hatfield Biotechnology Ltd		1	0.8%					
Totem Oysters Ltd.		1	0.8%					
Yellow Island Aquaculture (1994) Ltd.		1	0.8%					
622335 British Columbia Ltd.		1	0.8%					
Sea Spring Salmon Farm Ltd.								
WestCoast Fishculture Ltd.								
		7	5.6%					
Total		125	100.0%					

Sources:
(1) Salmon Farmers' Association.
(2) IntraFish Media Industry Report. The world's 30 largest salmon producers. June 2006.
(3) Pan Fish Annual Report 2005.
(4) Mainstream Annual Report 2005.

3.2 Licensed tenures, by region

As presented in Exhibit 3b, North Vancouver Island & Georgia Strait is the region with the greatest number of licences (94), representing approximately 75% of the total tenures. The South and West Vancouver Island region follows with 25 licences (20%). The other licenced sites in operation are in the South Coast.

Exhibit 3b
Salmon farming companies' tenures, by region

Company - Association with License Holders	Regions: South & West Vancouver Island #1	Fraser River #2	North Vancouver Island & Broughton's #3	Central Coast #4	North Coast[1] #5	Total
Pan Fish	1		24		2	27
Marine Harvest Canada	1		39	5		45
Mainstream Canada	16		12			28
Grieg Seafood BC Ltd.			8			8
Target Marine Products			8			8
Creative Seafoods Creative Salmon Co. Ltd.	6					6
Independents	1		2			3
Total	25	0	94	5	2	125

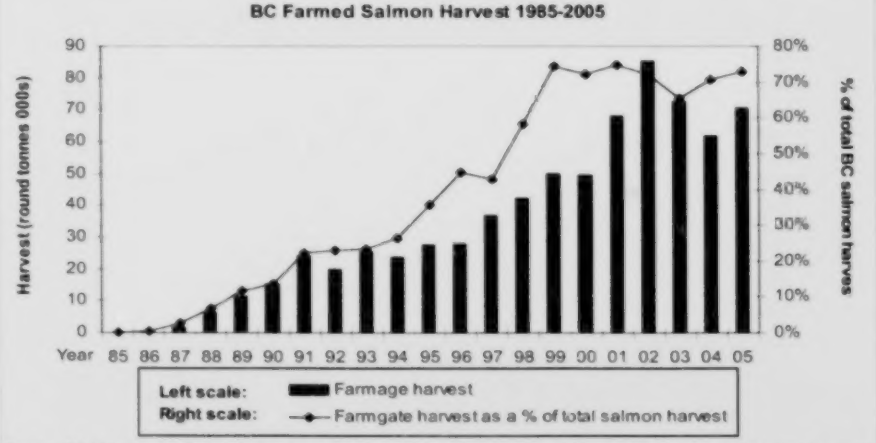
1 The two licensed tenures are currently inactive.

3.3 Growth of the industry since 1985

As illustrated in Exhibit 3c, the BC salmon farming industry grew from almost nothing in the early 1980s to 85,000 tonnes in 2002. Production then declined to 62,000 tonnes in 2004, but rebounded to 70,600 tonnes in 2005, and approximately 83,000 tonnes in 2006 (preliminary figure).

Farmed salmon has accounted for more than 65% of all commercial salmon harvest volume between since 1999.

Exhibit 3c —BC salmon farmgate harvest

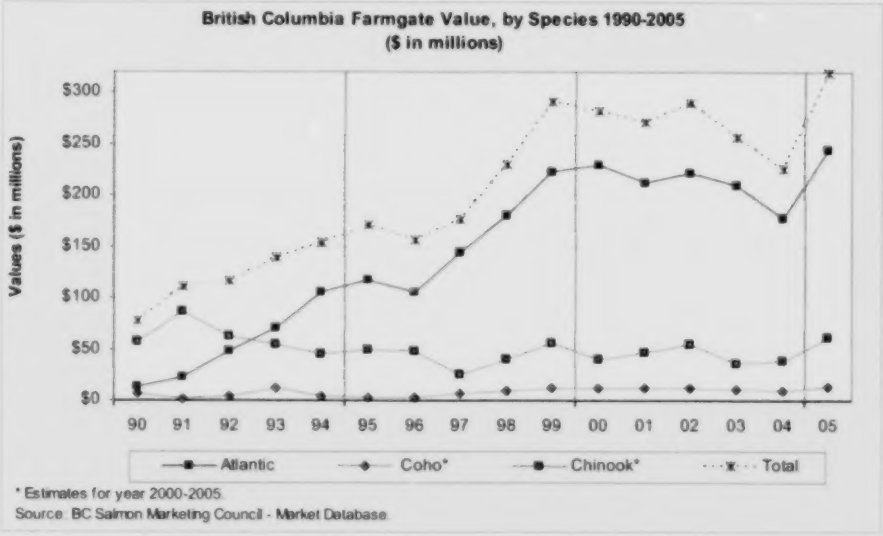


Source: BC Ministry of Agriculture, Food and Fisheries. Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004, 2005).

3.4 Farmed salmon species

As illustrated in Exhibit 3d, Atlantic salmon (76%) and chinook (22%) are the predominant salmon species farmed in BC, with coho (2%) produced on a much smaller scale[1].

Exhibit 3d — BC farmed salmon farmgate value by species 1990-2005



3.5 Price trends

As illustrated in Exhibit 3e, BC farmed salmon has experienced a number of price swings over the past two decades:

- **Between 1987 and 1991** — As BC production grew, prices fell from the higher levels first associated with the new product.
- **Mid 1990s** — A sluggish Japanese economy, rising BC and Chilean production, and reduced production costs, all put downward pressures on farmed salmon prices.
- **Between 2000 and 2002** — Global production, especially from Chile (see Exhibit 3g), rose significantly[2] between 1999 and 2001, leading to a drop in world prices.

Farmed salmon prices have rebounded in recent years, particularly since 2004, and especially in Japan and the European Community. Some of the Chilean exports have been diverted away from the US market by higher demand and better prices in other markets. US prices for farmed fresh fillets increased from US $3.40/lb in

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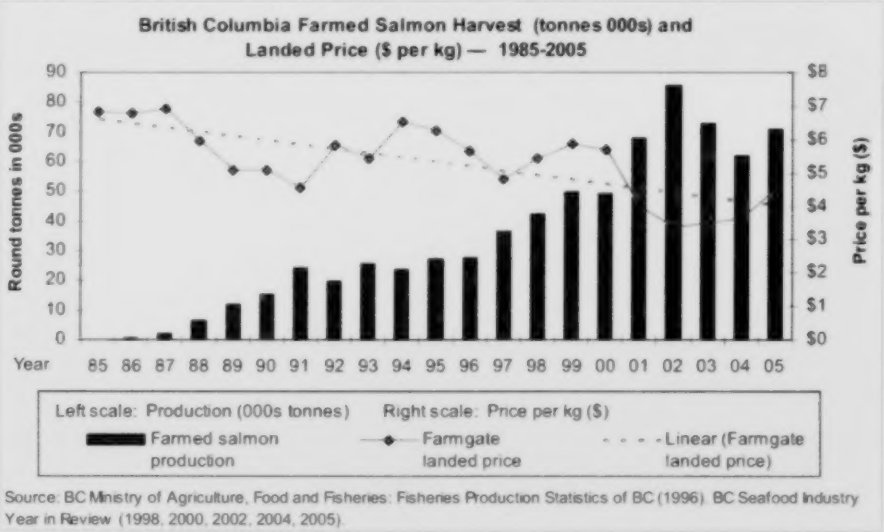
[1] BC Ministry of Agriculture and Lands: Salmon Aquaculture in BC - 2003 Quick Facts.

[2] Global production of farmed salmon increased one third, from 900,000 to 1.2 million tonnes over the two-year period. Source: FAO Fish Statistics.

December 2005 to a high of US $4.40/lb in September 2006, before softening to $4.10/lb in December 2006[1].

Exhibit 3e
Farmgate production and landed price of BC farmed salmon - 1985 - 2005



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004, 2005).

3.6 Trends in total output

Exhibit 3f illustrates recent year trends for BC farmed salmon, highlighting the significant turnaround in the industry between 2004 and 2005, when wholesale values increased from $287 million to $371 million. A significant increase for 2006 is expected when figures are finalized.

[1] FOB Miami, 3-4 lbs. Source: FAO Globefish Market Reports: Salmon - September 2006 and December 2006 (www.globefish.org)

Exhibit 3f
Farmgate and wholesale value of BC farmed salmon ($ in millions)

	Farmgate[1] value				Wholesale value[2]			
	2002	2003	2004	2005[3]	2002	2003	2004	2005[3]
Atlantic	n/a	212.9	174.5	252.2	n/a	241.0	206.7	293.8
Pacific	n/a	42.9	50.7	66.5	n/a	61.0	80.7	77.3
Total	289.0	255.8	225.2	318.7	338.9	302.0	287.4	371.1

1 Farmgate value is the price paid to aquaculturists for the whole fish.

2 Wholesale value refers to the value of the fish after processing. All of the fish from BC landings are included in the wholesale value, as well as all fish imported from outside BC that has undergone processing within the province.

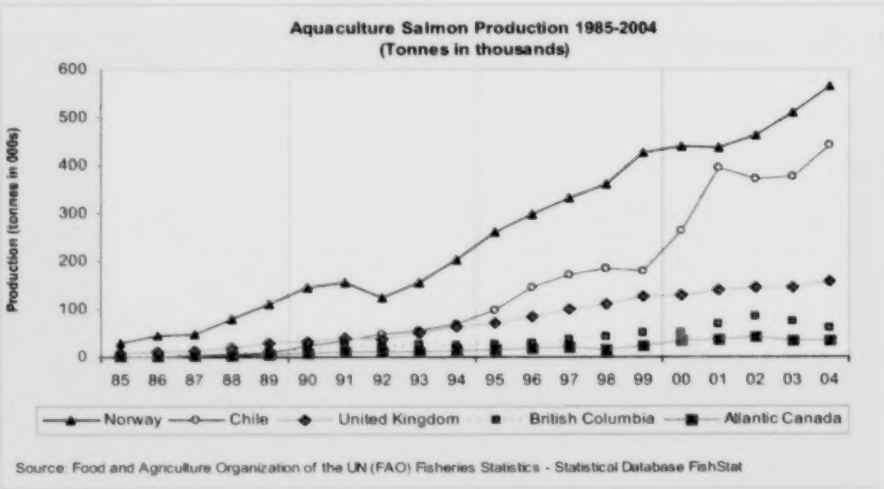
3 In aquaculture, the difference between farmgate and wholesale values is not as significant as in the wild salmon fisheries, as 70% of farmed salmon is sold as fresh dressed, requiring little processing. Also, only a very small portion of processed salmon comes from imports

Source: BC Ministry of Agriculture, Food and Fisheries: BC Seafood Industry Year in Review (2002-2005).

3.7 BC's share of international production

According to the UN's FAO[1], total world production of farmed salmon was 1.35 million tonnes[2] in 2004. As illustrated in Exhibit 3g, Norway (with a production of 566,000 tonnes) is the largest producer of farmed salmon. It is followed by Chile (443,000 tonnes), and the UK (173,000 tonnes). Canada is fourth with 97,000 tonnes, of which approximately two-thirds is produced in BC and one third in Atlantic Canada (New Brunswick).

Exhibit 3g — Aquaculture salmon production for major producing countries and regions 1985-2004 (Tonnes 000s)



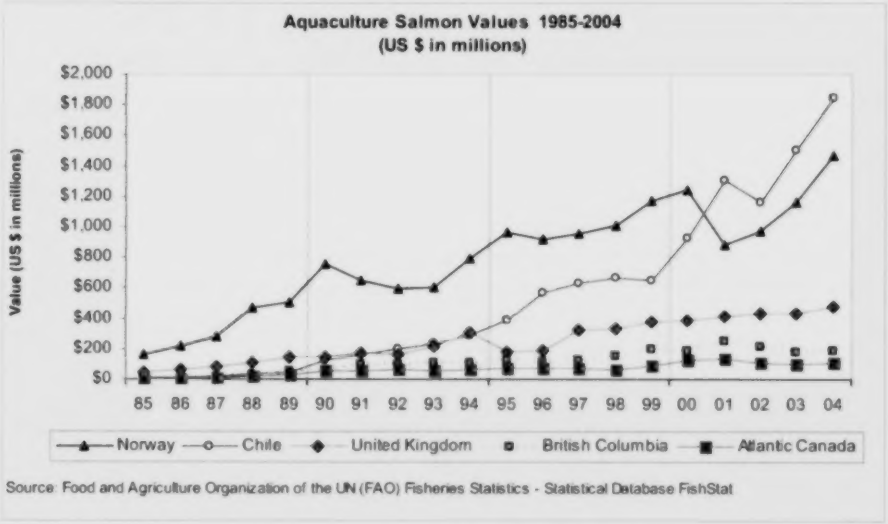
Source: Food and Agriculture Organization of the UN (FAO) Fisheries Statistics - Statistical Database FishStat

[1] Food and Agricultural Organization.

[2] FAO Fish Statistics.

World farmed salmon values totalled US $4,520 million in 2004, as illustrated in Exhibit 3h. Chile reported the highest value at US$1,848 million, followed by Norway at US$1,472 million and the UK at US$474 million. BC's US$190 million[1] represented approximately 4% of total world production in 2004.

Exhibit 3h — Aquaculture salmon values for major producing countries and regions 1985-2004 ($US in millions)



Source: Food and Agriculture Organization of the UN (FAO) Fisheries Statistics - Statistical Database FishStat

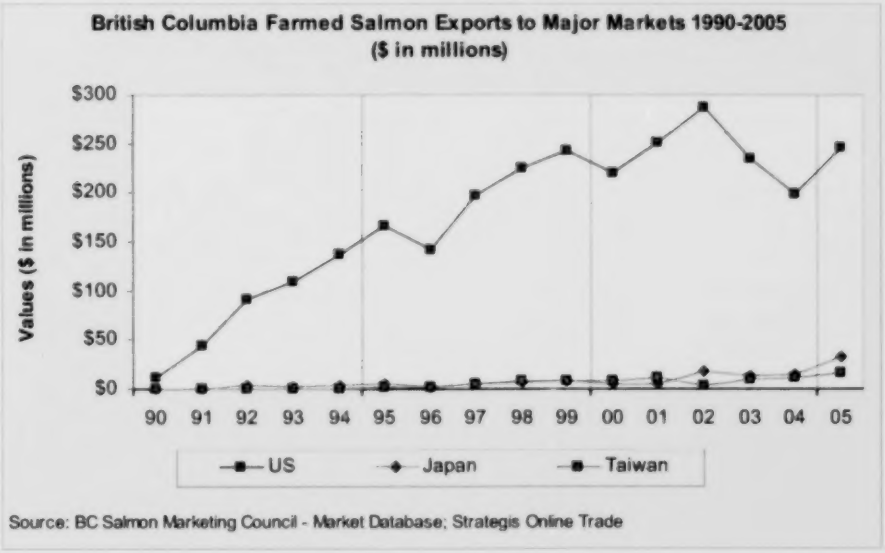
3.8 Markets for BC farmed salmon

Approximately 85% of BC farmed salmon is trucked from BC to Western US markets fresh, as whole fish (less the head and internal organs). The salmon typically arrives at US locations within hours of being harvested, where it is further processed for distribution to stores and restaurants. BC has a natural competitive advantage in Western US over other global sources of farmed salmon, because its close proximity permits the salmon to be shipped fresh.

Smaller quantities are also shipped to Japan and Taiwan. Exhibit 3i illustrates historical values of BC farmed salmon exports to major markets between 1990 to 2005.

[1] Data from this source (FAO) is not always completely reconcilable with BC and Canadian data.

Exhibit 3i — Value of farmed salmon exports by major markets

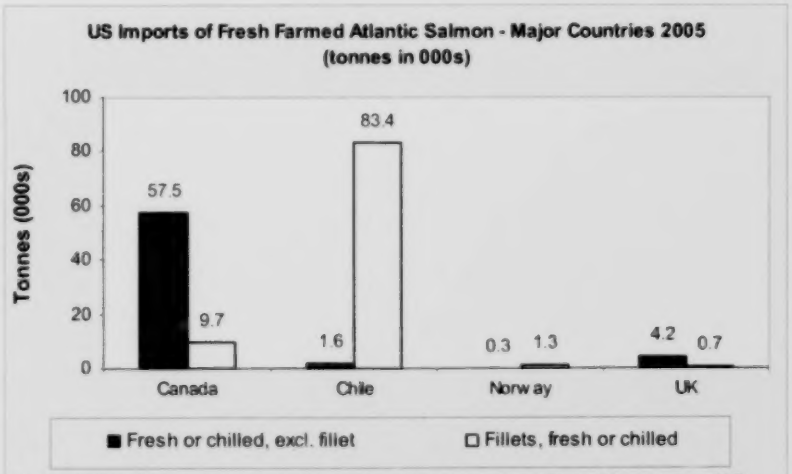


Source: BC Salmon Marketing Council - Market Database; Strategis Online Trade

3.9 Competition for the US farmed salmon market

Canada and Chile are the two major exporters of fresh/chilled farmed salmon to the US, as illustrated in Exhibit 3j.

Exhibit 3j — US imports of fresh farmed Atlantic salmon in 2005 (tonnes 000s) - Major countries



Source: Office of Trade and Industry Information (OTII), International Trade Administration, U.S. Department of Commerce:

Canada is the market leader in providing **whole** fresh/chilled (mostly fresh) farmed Atlantic salmon (excluding fillet) to the US. Canada exported 57.5 million tonnes (US $270.8 million) to the US in 2005, representing 89% of the US import market for whole fish.

Chile is the market leader in fresh/chilled (mostly chilled) **fillet**. Chile's exports to the US amounted to 83.4 million tonnes (US $433.5 million) in 2005, representing 87% of the US import market for fillets.

Norway and the **UK** export small quantities of farmed salmon to the US.

3.10 BC's Production cost competitiveness

In 2003, the BC Government commissioned an independent study to analyze BC salmon farm's production cost competitiveness. BC was assigned a cost index of 100 and was compared to four other jurisdictions. As shown in Exhibit 3k, non-Canadian jurisdictions had a cost index lower than that of BC.

Exhibit 3k
Global Cost — Competitiveness of BC Salmon

	Cost Index (BC = 100)	Sources of cost advantage	Sources of cost disadvantages
Canada			
• New Brunswick	106.5		Higher smolt costs, longer grow-out
• British Columbia	100.0		
Norway	95.5	Lower smolt and labour costs, greater scale economies	
United Kingdom	95.3		
Chile	86.8	Lowest smolt, feed, labour and depreciation costs	Transport to market

1 Source: PriceWaterhouseCoopers, A Competitiveness Survey of the BC Salmon Farming Industry, 2003, performed for the Province of BC.

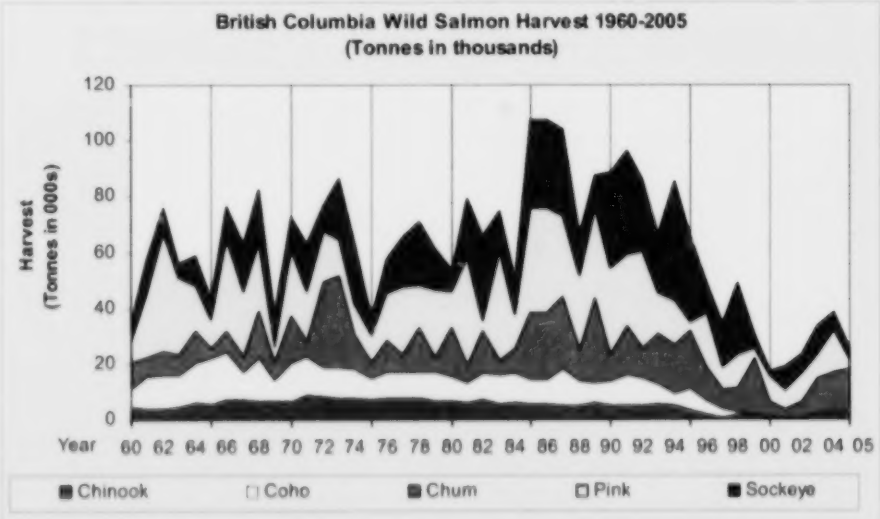
The analysis indicates that BC salmon farmers are at a significant production cost disadvantage to other major producing countries, particularly to Chile.

4. Wild Salmon Commercial Fishing

4.1 Long-run harvest trends

Exhibit 4a illustrates historical trends in total salmon catch over the past four decades in British Columbia.

Exhibit 4a
Long-term harvest trends by species (round tonnes in 000s)



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004). Special Report (2005)

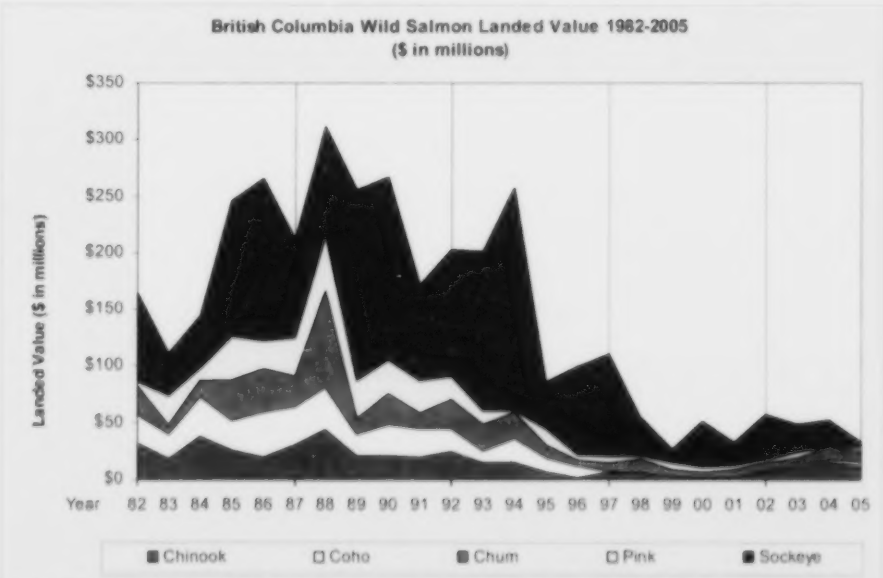
The chart illustrates the wide variations in annual catch levels from year to year, as well as the lower catch levels beginning in the 1990s as DFO resource management practices became more precautionary.

The chart also illustrates the decline in the commercial fishing sector's capture of chinook and coho salmon, following the priority allocation of these species to the recreational fishing sector starting in 1999.

4.2 Landed values

Exhibit 4b illustrates landed values of wild salmon over the past 20 years. Those trends are similar to the annual catch trends, showing significant declining values beginning in the mid 1990s.

Exhibit 4b — Total landed values by species



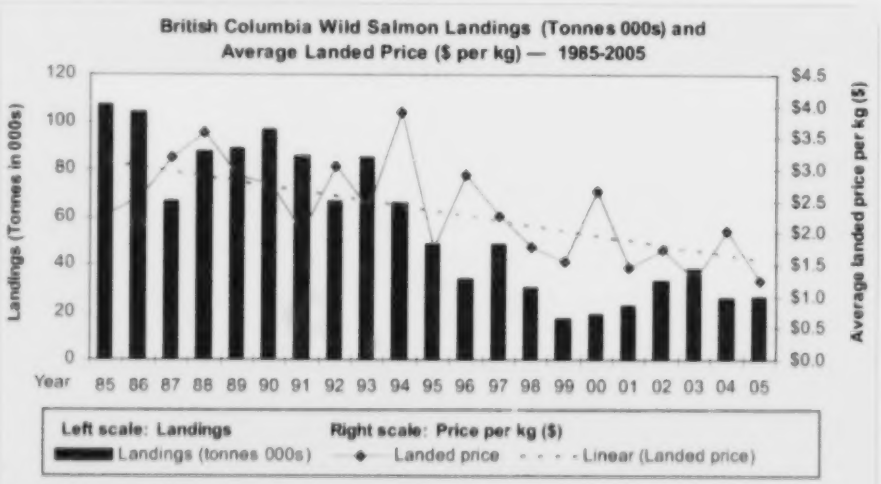
Source: BC Ministry of Agriculture, Food and Fisheries. Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004). Special Report (2005)

Exhibit 4b also illustrates the relative importance of higher-value sockeye, coho and chinook salmon relative to the lower-value chum and pink salmon (most of which is canned). With the recreational sector having priority access to chinook and coho, the wild commercial sector has become heavily dependent on sockeye as a major source of income in most recent years.

4.3 Trends in landed prices

As illustrated in Exhibit 4c, average landed prices have also fluctuated over the past 20 years. Long-term trends show a general decline in the average landed price.

Exhibit 4c — Wild salmon landings (tonnes in 000s) and average landed price ($ per kg) - 1985-2005



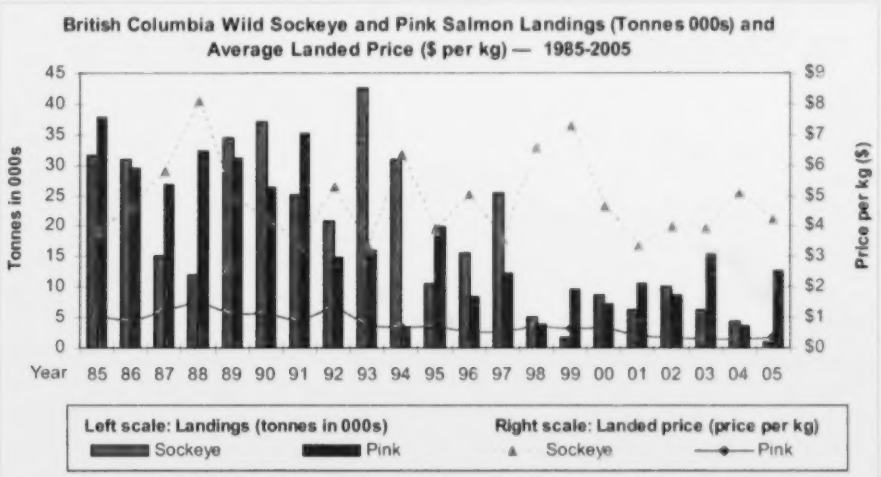
Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996), BC Seafood Industry Year in Review (1998, 2000, 2002, 2004), Special Report (2005)

Much of the decline in wild salmon prices is attributable to the growth of the global farmed salmon industry, and the resulting downward pressure on prices.

4.4 Landed price trends for sockeye and pink salmon

Exhibit 4d illustrates sockeye and pink salmon landed prices over the past 20 years.

Exhibit 4d
Landings (tonnes in 000s) and average landed price ($ per kg) for sockeye and pink salmon — 1985-2005



Source: BC Ministry of Agriculture, Food and Fisheries: Fisheries Production Statistics of BC (1996), BC Seafood Industry Year in Review (1998, 2000, 2002, 2004), Special Report (2005)

Absolute prices and price trends vary by species:

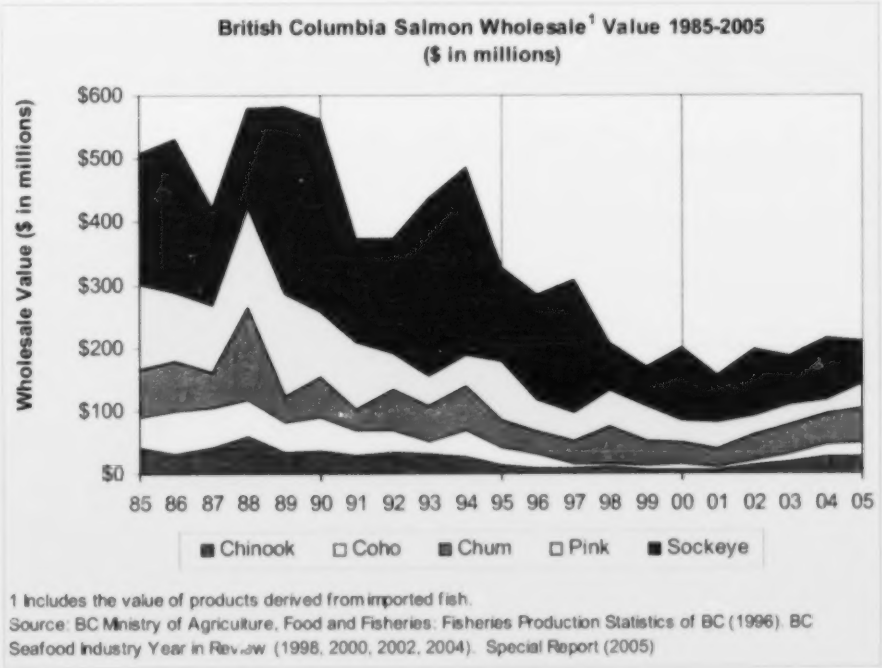
- **Sockeye** — Sockeye prices show major variations, generally in inverse relation to production levels (i.e. in low production years prices are higher). One notable exception is in the early 2000s, when both quantity and prices remained low. As sockeye is in direct competition with farmed salmon (especially in the Japanese market), sockeye prices have been affected by lower world market prices in recent years.

- **Pink** — At the low end of the price scale, pink salmon prices show less fluctuation, although they have also declined over the past 20 years. Most of the pink salmon harvest is canned, and thus is less directly impacted by increased world production of farmed salmon, which is generally sold fresh or frozen.

4.5 Wholesale (processed) wild salmon values

Exhibit 4e illustrates trends in the wholesale values (including Alaskan fish imported for processing) of sockeye, pink, chum, coho and chinook salmon over the past two decades.

Exhibit 4e
Total wholesale values by species



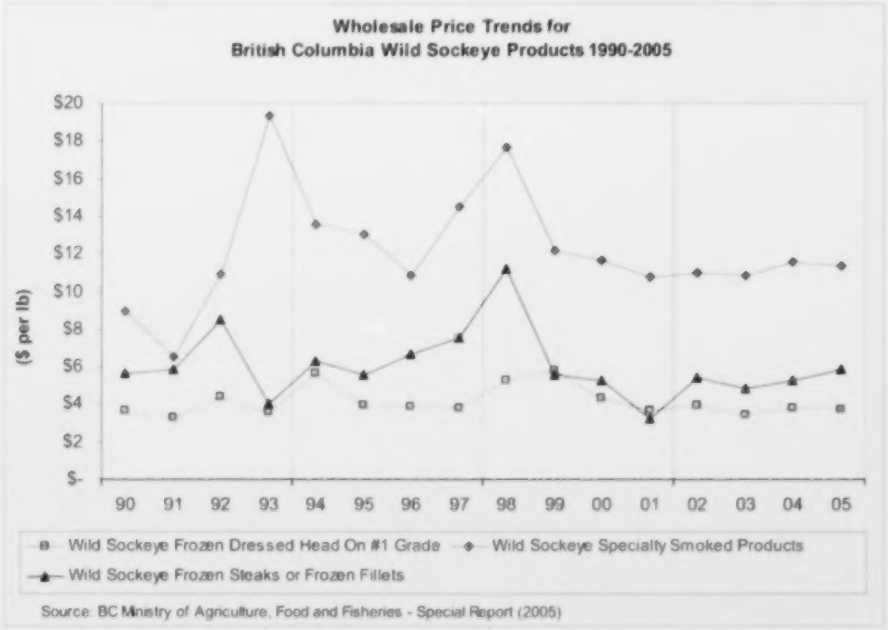
1 Includes the value of products derived from imported fish.
Source: BC Ministry of Agriculture, Food and Fisheries. Fisheries Production Statistics of BC (1996). BC Seafood Industry Year in Review (1998, 2000, 2002, 2004). Special Report (2005)

Of the five wild species presented in Exhibit 4e, pink and chum wholesale values have been most stable since the mid-90s. Much of the pink and chum harvest is canned.

4.6 Trends in wild sockeye prices

As illustrated in Exhibit 4f, prices for different types of sockeye products have remained fairly stable in the past five years, following significant variations in the 1990s.

Exhibit 4f
Price for wild sockeye products

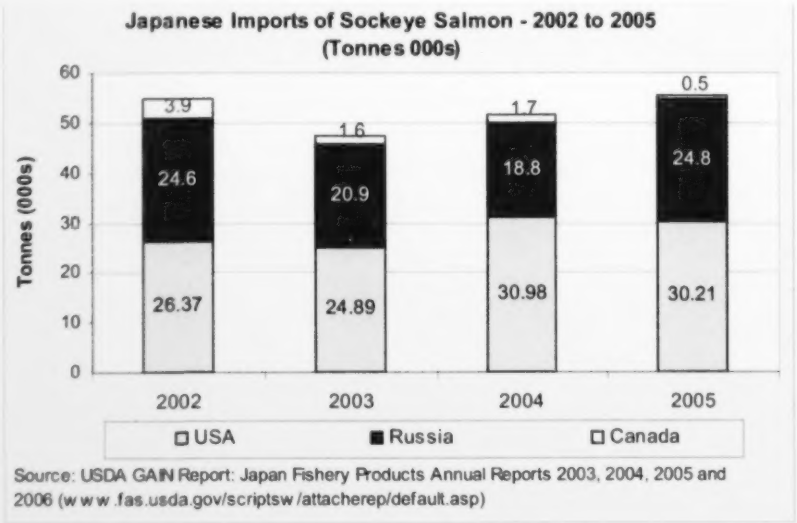


Wild sockeye prices have been strengthening in 2006 and early 2007, in concert with strong farmed salmon prices.

4.7 BC's sockeye share of Japan market

Exhibit 4g shows Japan's recent years imports of sockeye salmon, by major countries.

Exhibit 4g
Japan's imports of wild sockeye salmon (Tonnes 000s)



Source: USDA GAIN Report: Japan Fishery Products Annual Reports 2003, 2004, 2005 and 2006 (www.fas.usda.gov/scriptsw/attacherep/default.asp)

Japan has been a premium market for BC wild sockeye frozen salmon, importing 3,900 tonnes in 2002. However, BC sockeye exports to Japan have declined in recent years, and were less than 500 tonnes in 2005. Prices have also been falling, due in part to low-priced Pacific farmed salmon (such as coho and sockeye) from Chile. Over the past three years, wholesale prices in Japan for frozen sockeye have been near record lows (US $2.00-2.50/kg)[1].

[1] Source: Eurofish Salmon report, December 2006 (www.eurofish.dk)

4.8 Exports to the United States

The US is also an important export market for BC sockeye, chum, coho and chinook, as illustrated in Exhibit 4h.

Exhibit 4h
BC exports of wild salmon to the US (tonnes), by level of processing and species — 2002 - 2005

	2002	2003	2004	2005
		— Tonnes —		
▪ Fresh fillet (all)	1,211.4	2,360.4	1,902.5	1,521.2
▪ Fresh or chilled (dressed)				
• Sockeye	254.2	187.9	204.8	77.2
• Chinook	232.6	586.7	808.7	871.8
Total fresh or chilled	486.8	774.6	1013.5	949.0
▪ Frozen				
• Sockeye	142.9	107.2	43.7	10.6
• Chum	1,943.3	1,548.6	2,046.8	1,890.6
• Coho	234.5	277.2	156.1	187.2
• Chinook	870.2	346.1	1,322.6	569.4
Total frozen	3,190.9	2,279.1	3,569.2	2,657.8

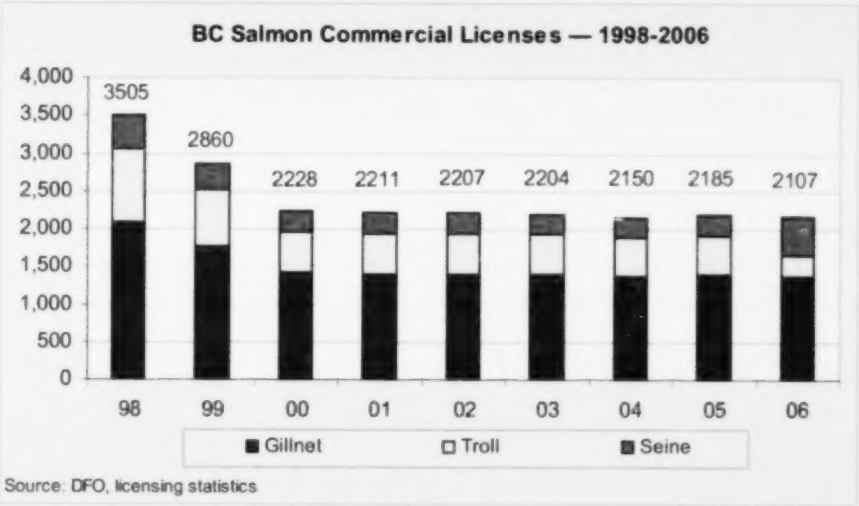
Source: Office of Trade and Industry Information (OTII), International Trade Administration, U.S. Department of Commerce (http://www.ita.doc.gov/td/industry/otea/trade-detail/)

These volumes are far lower than those prevailing prior to the growth of the salmon farming industry, and reflect the salmon farming industry's success in the US marketplace.

4.9 Size of industry

As shown in Exhibit 4i, the number of BC commercial salmon licences has remained fairly constant (around 2,200) since 2000. This stability follows a decline in the late 1990s resulting from the purchase or retirement of commercial salmon licences by DFO, as part of their wild salmon fishery conservation initiatives.

Exhibit 4i — BC salmon commercial licences 1998-2006



As illustrated in Exhibit 4j, in 2006, there were 2,107 commercial salmon licences, including 1,319 gillnet, 263 seine and 462 troll.

Exhibit 4j
Number of salmon fishing licences, owners, vessels and crew, by type of licence (2006)[1]

Type of licence	Number of licences	Approx. # of owners	Approx. # of vessels	Average crew per vessel[2]	Estimated total crew[3]
Gillnet	1,319	811	1,062	1 to 2	1,062 to 2,124
Seine	263	116	186	4 to 5	744 to 930
Troll	525	434	462	3 to 5	1,386 to 2,310
Total	2,107	1,361	1,710	n/a	3,192 to 5,364

1 Source: DFO Licence Reports, excepted as noted.
2 Source: ARA Consulting: "The Economic Value of Salmon: Chinook and Coho in BC", 1996 (p. 2-2).
3 The 2004 Gislason Report "BC Seafood and Recreational Fishing SWOT", estimates total crew as 3,570 (1760 vessels x 2.1 crew/vessel) in 2002 (p. A-2).

The industry is generally acknowledged to have much more harvesting capacity than is required. Most salmon fishing operators are more reliant on other sources of fishing (groundfish, etc.) than on revenues from salmon fishing, which has become an increasingly part-time economic activity. (Employment is further discussed in Appendix A, Section A.3).

4.9.1 Industry catch by type of gear and fish

As illustrated in Exhibit 4k, seiners accounted for 63% of tonnage in 2005, followed by gillnetters at 26% and trollers at 11%.

Exhibit 4k
Catch by type of gear and fish, 2005

	Tonnes			
	Gillnet	Seine	Troll	Total
Chinook	289	0	1,719	2,008
Chum	5,355	4,935	233	10,523
Coho	45	281	811	1,137
Pink	805	11,689	94	12,588
Sockeye	567	324	42	933
Total	7,061	17,229	2,899	27,189
	(26%)	(63%)	(11%)	

Source: DFO commercial statistics.

5. Salmon Sport (Recreational) Fishing

5.1 Industry licensing trends

Until the early 1980s, recreational anglers did not require fishing salmon licences. In 1981, DFO introduced recreational licences and restricted the minimum size and daily bag limit of chinook and coho. In 1999, a new recreational policy was implemented, reducing further the 1981 recreational limits. At that time, DFO also gave sport fisheries priority to chinook and coho allocation, based on "overall abundance each year".

Exhibit 5a shows sports fishing licensing trends for four-year periods, for 1982-85, 1992-95 and 2002-05.

Exhibit 5a
Sports fishing licensing

	Four-year average			Percentage change over previous period	
	1982 to 1985	1992 to 1995	2002 to 2005	% change 1982-85 to 1992-95	% change 1992-95 to 2002-05
Resident licence					
- Annual	248.3	201.8	120.1	-18.7%	-40.5%
- Other	n/a	64.0	86.1	n/a	+34.4%
Total residents	248.3	265.8	206.2	+7.0%	-22.4%
Non-resident licence					
- Annual	19.6	13.8	5.3	-29.5%	-61.7%
- Other	42.8	71.5	65.3	+67.0%	-8.7%
Total non-residents	62.4	85.3	70.6	+36.7%	-17.2%
Total[1] licences issued	310.7	351.1	276.8	+13.0%	-21.2%

1 Excludes licences issued to juveniles under 16 years of age (free)

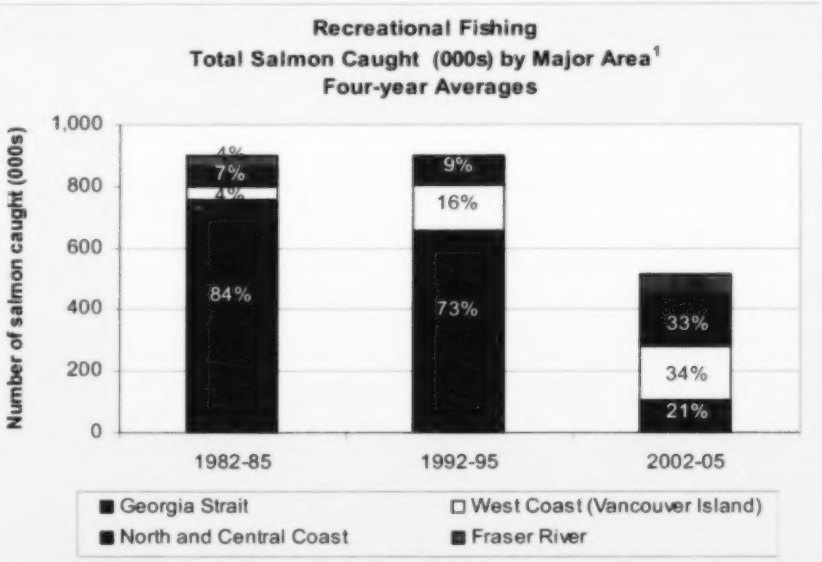
Sources: DFO Recreational licensing statistics; ARA Consulting - The Economic Value of Salmon (1996)

As illustrated in Exhibit 5a, the total number of licences issued increased by 13% between 1982-85 and 1992-95 and then decreased by 21.2% between 1992-95 and 2002-05. Annual licences incurred the greatest change from 1992-95 and 2002-05, with a reduction of 40.5% for resident anglers and 61.7% for non-residents, while other "resident licences" increased by 34.4% over the same period. (This increase may be the result of some annual-licence holders replacing annual licences with short-term licences.)

5.2 Catches by fishing area

Exhibit 5b illustrates recreational salmon fishing trends over the past 20 years.

Exhibit 5b
Recreational fishing salmon catches by major fishing area - Four-year averages



1 Excludes Johnstone Strait, as no data was available for 1982-85 and 1992-95
Source: DFO Recreational statistics

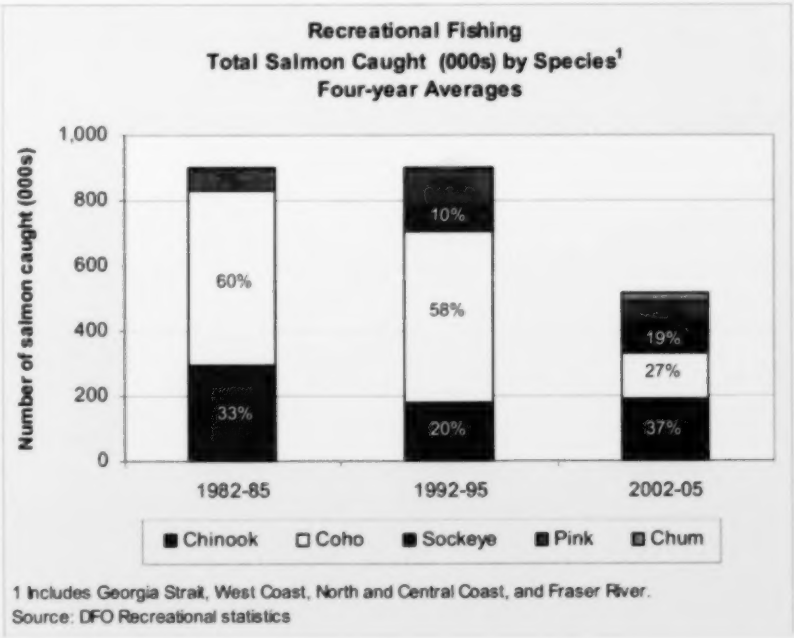
In the 1980s, 84% of salmon caught by recreational anglers was captured in the Georgia Strait. By 1992-95, although the Georgia Strait was still the major location for recreational fishing, accounting for 73% of salmon caught, the West Coast of Vancouver Island and the North and Central Coast areas were more productive, representing 25% of total capture.

By 2002-05, trends changed significantly with the decline of the Georgia Strait recreational fishery. Total salmon catch dropped by nearly half, from an average of 900,000 salmon in 1992-95 to just over 500,000 in 2002-05, and two-thirds of recreational salmon catches were on the West Coast and North and Central Coast areas.

5.3 Recreational catches by species

Exhibit 5c shows trends in recreational fishing catches, by species.

Exhibit 5c
Recreational fishing salmon catches by species – Four-year averages



1 Includes Georgia Strait, West Coast, North and Central Coast, and Fraser River.
Source: DFO Recreational statistics

In 1982-85, coho and chinook represented 60% and 33% respectively of recreational salmon catch, accounting for more than 90% of total. By 2002-05, as total catch dropped dramatically, coho's share was only 27%, with much of the decline occurring in Georgia Strait.

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Exhibit 5b
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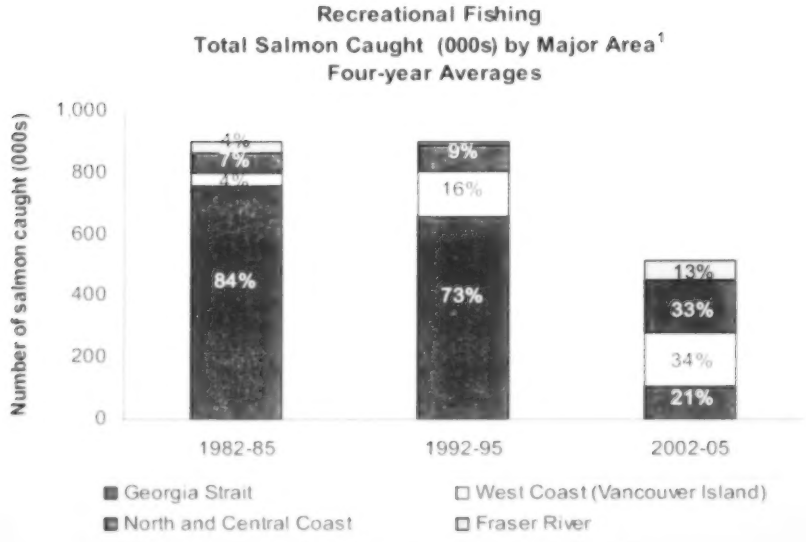

1 Excludes Johnstone Strait, as no data was available for 1982-85 and 1992-95
Source: DFO Recreational statistics

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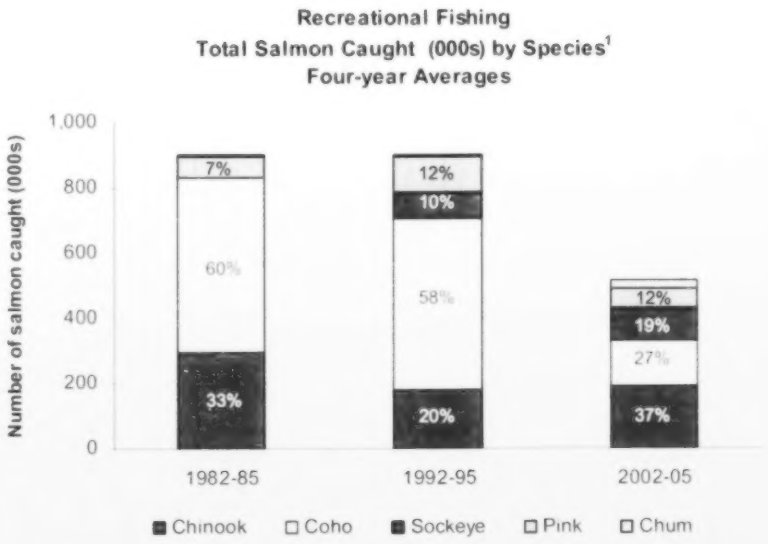


1 Includes Georgia Strait, West Coast, North and Central Coast, and Fraser River.
Source: DFO Recreational statistics

In 1982-85, coho and chinook represented 60% and 33% respectively of recreational salmon catch, accounting for more than 90% of total. By 2002-05, as total catch dropped dramatically, coho's share was only 27%, with much of the decline occurring in Georgia Strait.

5.4 Levels of fishing effort and catches

Exhibit 5d illustrates trends in levels of fishing effort and catches, by area and species.

Levels of fishing effort and productivity have changed in different regions of BC:

- In **Georgia Strait**, the angler effort (boat trips) declined by 68% between 1992-95 and 2002-05, and salmon caught declined by 84%. Average catch per boat trip is declined from 1.53 to 0.77, mainly because of the almost complete loss of the coho fishery.
- In the **West Coast of Vancouver Island**, trends are very different. Angler effort increased by 77% between 1992-95 and 2002-05, and the average catch in 2002-05 was 2.2 per boat trip.
- In the **North and Central Coast**, the total salmon catch (mainly chinook and coho) nearly doubled between 1992-95 and 2002-05.
- In the **Johnstone Strait,** historical data are limited, but average catch (more than 50% pink) in 2002-05 was 2.1 salmon per boat trip.
- In the **Fraser River**, total salmon caught declined between 1982-85 and 1992-95 (decline in chinook/coho landings), but increased in 2002-05 (increases in chinook, pink, sockeye and chum landings) as the recreational sector was given greater access to these stocks by DFO.

Exhibit 5d
Trends in recreational fishing salmon effort and catches by species

	Average 1982-85	Average 1992-95	Average 2002-05	Ten-year trend 1992-95 to 2002-05	
				Values	%
Georgia Strait					
• Angler effort (boat trips)	593,171	430,219	138,353	-291,867	-68%
• Total salmon caught	758,484	656,981	107,065	-549,916	-84%
• Average catch by boat trip	1.28	1.53	0.77	-0.75	-49%
- Chinook	230,094	89,234	37,285	-51,949	
- Coho	488,770	452,619	7,780	-444,840	
- Pink	39,605	98,555	42,479	-56,077	
- Sockeye	15	12,574	3,791	-8,783	
- Chum	n/a	3,999	15,731	+11,732	
West Coast (Vancouver Island)					
• Angler effort (boat trips)	n/a	44,365	78,564	+34,199	+77%
• Total salmon caught	38,264	145,513	172,484	+26,972	+19%
• Average catch by boat trip	n/a	3.28	2.20	-1.08	-33%
- Chinook	32,875	53,038	72,574	+19,536	
- Coho	2,593	27,554	42,864	+15,310	
- Pink	n/a	583	1,978	+1,396	
- Sockeye	2,797	64,257	54,776	-9,481	
- Chum	n/a	82	293	+211	
North and Central Coast					
• Angler effort (boat trips)	n/a	n/a	n/a	n/a	n/a
• Total salmon caught	66,442	85,361	167,702	+82,341	+96%
• Average catch by boat trip	n/a	n/a	n/a	n/a	n/a
- Chinook	14,980	35,771	71,871	+36,100	
- Coho	27,614	38,932	87,108	+48,176	
- Pink	20,544	8,132	7,039	-1,093	
- Sockeye	200	435	96	-339	
- Chum	3,104	2,091	1,588	-504	
Johnstone Strait					
• Angler effort (boat trips)	n/a	n/a	13,418	n/a	
• Total salmon caught	n/a	n/a	28,456	n/a	
• Average catch by boat trip	n/a	n/a	2.12	n/a	
- Chinook	n/a	n/a	7,913	n/a	
- Coho	n/a	n/a	3,339	n/a	
- Pink	n/a	n/a	15,753	n/a	
- Sockeye	n/a	n/a	641	n/a	
- Chum	n/a	n/a	810	n/a	
Fraser River					
• Angler effort (hours)	n/a	n/a	503,825	n/a	n/a
• Total salmon caught	37,352	12,436	65,714	+53,278	+428%
• Average catch by effort hours	n/a	n/a	0.13	n/a	n/a
- Chinook	16,550	3,049	9,704	+6,655	
- Coho	15,617	6,779	680	-6,099	
- Pink	815	706	11,717	+11,010	
- Sockeye	n/a	1,626	39,500	+37,874	
- Chum	4,369	277	4,114	+3,837	
Total BC salmon recreational catch, by species					
• Total salmon caught	900,541	900,291	541,421	-358,869	-40%
- Chinook	294,490	181,092	199,347	+18,255	
- Coho	534,594	525,884	141,770	-384,114	
- Pink	60,964	107,976	78,966	-29,010	
- Sockeye	3,012	78,892	98,805	+19,913	
- Chum	7,473	6,448	22,535	+16,087	

1 Averages for 1982-85 and 1992-95 exclude data from Johnstone Strait which was not available.

Source: DFO recreational fishing statistics.

6. Salmon Processors and Distributors

The seafood processing industry includes activities such as fish processing, fish buying, fish broker, fish vending, and marine plant harvesting.

6.1 Commercial seafood licences

As shown in Exhibit 6a, in 2003 the total number of seafood processing and distributing licences was 1235, of which approximately 31% (385) were salmon-related.

Exhibit 6a
Commercial seafood licences 2003

	Total	% of salmon	# of Salmon Licences
■ **Fish processing**			
• Commercial salmon cannery large	7	100%	7
• Commercial salmon cannery small	3	100%	3
• Salmon	107	100%	107
• Sport caught fish	16		-
• Fin fish (other than salmon)	91		-
• Cold storage (large and small)	117		-
• Invertebrates	89		-
• Marine plants	9		-
• Trout only	5		-
• Non-human consumption	11		-
• Roe herring	33		-
Total processing	488		117
■ **Fish buying station**			
• Salmon	129	100%	129
• Roe herring	50		-
• Fin fish (other than salmon)	42		-
• Invertebrates	110		-
Total buying stations	331		129
■ Fish vending	347	40%[1]	139
■ Marine plant harvesting	69		-
Total commercial seafood licences	**1,235**		**385**
% of salmon-related licences			31%

1 Based on percentage of fish buying stations.

Source: BC Ministry of Agriculture and Lands: Fisheries Statistics, Licensing Statistics - Commercial Seafood Activities 2003 (http://www.al.gov.bc.ca/fish_stats/licences/licence-stats-comm-fish.htm).

6.2 BC salmon processors

Exhibit 6b profiles 25 significant salmon processors in British Columbia in 2005. Of these processors, 17 primarily process wild salmon, and eight primarily process farmed salmon.

Exhibit 6b
Major BC salmon processors

Company	Type of salmon processed		Plant location	Employment (full & part-time)
	Wild	Farmed		
PRIMARILY PROCESSING WILD SALMON				
Agri-Marine Processing	Yes	No	Campbell R.	51-100
Albion Fisheries Ltd	Yes	Yes	Vancouver, Victoria, Queen Charlotte	245
Andersen Foods International	Yes	No	Prince Rupert	100+
Blue Tornado Enterprises Inc.	Yes	No	Sooke	21-50
Blundell Seafoods	Yes	No	Richmond	100+
Canadian Fishing Company	Yes	No	Vancouver, Prince Rupert	1,500
Coastwide Fishing Ltd.	Yes	No	Richmond	51-100
French Creek Seafood	Yes	No	Parksville	21-50
Great Glacier Salmon Ltd.	Yes	No	Prince Rupert	21-50
Harbour Marine Products	Yes	No	Vancouver	40-150
Hardy Buoys Smoked Fish	Yes	Yes	Port Hardy	2-20
Hi-To Fisheries	Yes	No	Richmond	51-100
JS McMillan Fisheries Ltd.	Yes	No	Vancouver	200
Keltic Seafoods	Yes	No	Port Hardy	84
Ocean Fisheries Ltd.	Yes	No	Richmond	100+
Pacific Seafoods International	Yes	No	Sidney	221-51
Prince Rupert Custom Proc.	Yes	No	Prince Rupert	100
PRIMARILY PROCESSING FARMED SALMON				
Aquatic Seafoods	No	Yes		7
Browns Bay Packing	No	Yes	Campbell R.	130-200
Englewood Processing	No	Yes	Port McNeill	140
Walcan Seafoods	No	Yes	Quadra Island	45
Alpha Processing	No	Yes	Port Hardy	200
Target	Yes	Yes	Egmont	
Lions Gate Fisheries Ltd.	No	Yes	Vancouver, Tofino	130-200
SeaPrime Seafood Inc.	No	Yes	Tofino	21-50

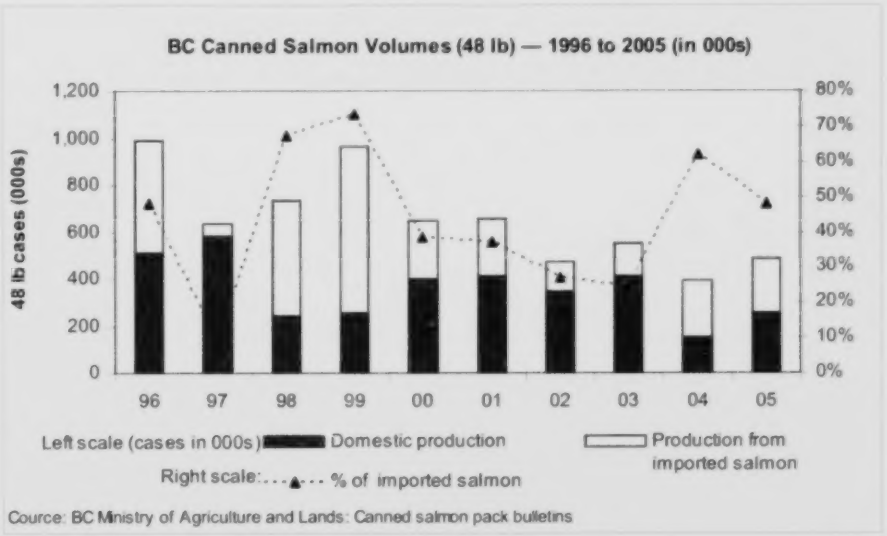
Sources: BC Salmon Farming Association; (http://www.bcseafoodonline.com); primary research.

6.3 Processed canned salmon

Exhibit 6c illustrates annual trends in the volumes of processed canned salmon. Domestic production was very low in 1998 and 1999. However, total production of canned salmon remained fairly high, as processors used more imported salmon (mostly from Alaska), to complement production from domestic fish.

Canning of domestic production rebounded in 2000-2003, but dropped again in 2004. In 2005, approximately half of canned salmon volumes were sourced domestically.

Exhibit 6c — Recent trends in processed canned salmon



Cource: BC Ministry of Agriculture and Lands: Canned salmon pack bulletins

7. Economic Impacts of Each Sector

This Chapter estimates the overall BC-wide economic impacts of each of the three salmon industry sectors:

- Salmon farming, including salmon aquaculture (growing) and processing.
- Wild commercial salmon fisheries, including capture and processing.
- Salmon sport fishing[1].

7.1 Economic measures

The main indicators of economic impact measured by the BCIOM[2] are the following:

- **Output** is the revenues earned by operations in the industry sector, measured in each sector as follows:
  - Salmon farming sector—wholesale value of farmed salmon.
  - Wild salmon commercial fishing sector—wholesale value of processed salmon.
  - Salmon sport fishing sector—angling-related revenues earned by operations providing goods and services to salmon sport fishers.
- **Gross Domestic Product (GDP)** is the value-added to the BC economy associated with the industry sector's activities. This measure reflects the total revenue earned by the industry sector, minus material inputs.
- **Government revenues.** Included in this measure are:
  - Personal income taxes.
  - Corporate income taxes (provincial only).[3]
  - Indirect taxes (including GST, PST, gas taxes) less subsidies.
  - Estimated municipal government revenues.
- **Employment** is estimated in terms of person-years, or full-time equivalent jobs (FTEs)[4].

Economic impacts that are directly linked to sector revenues are called **direct impacts** (output, GDP, government revenues and employment). **Indirect impacts** accrue to industries supplying goods and services to the industry in question (and

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[1] Economic impacts of other nature-based tourism industries reliant on salmon are addressed in Chapter 14.

[2] The Tourism British Columbia economic study of nature-based tourism applies similar concepts and definitions as the BCIOM.

[3] Statistics Canada does not have access to information required to calculate federal corporate taxes. Therefore, this value is excluded from the measure.

[4] The expressions "person-years" and "FTEs" are used interchangeably in this report.

their suppliers up through the value chain). **Induced impacts** are those that result when income associated with direct and indirect employment is spent in the BC economy.

7.2 Data sources and methodology

This analysis utilizes industry economic data available from various sources, using a base year of 2005, with historical data brought in to highlight industry trends.

7.2.1 General approach

The analysis makes extensive use of information developed though the BC Input Output Model (BCIOM), including economic multipliers and other values. The BCIOM is a simplified model of the BC economy. It allows analysts to estimate the impact of transactions that occur in a defined industry for the economy as a whole, using industry multipliers. Transactions in one industry usually have ramifications for a complex network of industries, government agencies and workers throughout the province.[1]

7.2.2 Adjustments to the BCIOM approach

For the purposes of this study, we have made a few adjustments to the BCIOM approach, of which the most significant are:

- **Inclusion of processing activities in estimating the economic impact of the salmon farming and wild commercial salmon sectors.** The BCIOM and many industry studies tend to treat salmon processing as a separate industry sector. For the purpose of this study, we have included salmon processing as part of the salmon farming and wild commercial sectors.

- **Basis for estimating employment figures.** Another area where adjustments have been made to BCIOM values is in employment estimates. Where BCIOM data are not available or not completely consistent with direct industry sources and reports, we have used both BCIOM and other sources in developing employment estimates. Details are contained in Appendix A.

- **Basis for salmon sport fishing multipliers.** Another adjustment to this study's general use of the BCIOM values is in assessing the salmon sport fishery. This industry is comprised of a broad range of business types offering a diverse portfolio of goods and services to anglers in support of their angling experience, and no single set of BCIOM industry multipliers is indicative of the segment's economic relationships.

  Fortunately, a study conducted for Tourism British Columbia[2] (one which includes saltwater sport fishing among 33 activities that comprise the nature-based tourism industry) maps these relationships directly from financial information provided by companies operating in the industry. Although the nature-based tourism industry encompasses a wider variety of activities undertaken, the spending patterns of their customers exhibit strong similarities.

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[1] See also BC Stats, "British Columbia Provincial Economic Multipliers and How to Use Them," October 2005.

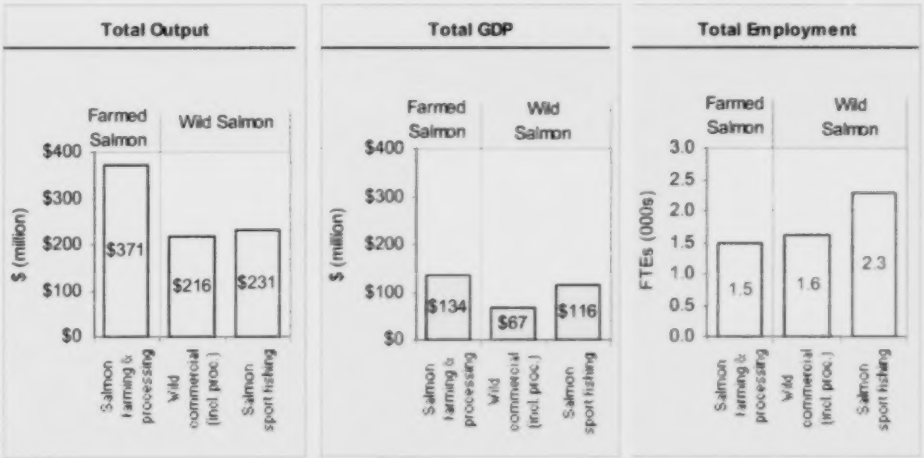
[2] Tourism British Columbia, "Economic Value of the Commercial Nature-Based Tourism Industry in British Columbia," September 2004.

Accordingly, we have used the results of the Tourism BC study as a key source (along with other industry studies) in estimating salmon sport fishing economic multipliers and other values. Further details of our approach are described in the study Appendices.

7.3 Direct economic impacts

The direct economic impacts of salmon-based industry activities in 2005 are summarized in Exhibit 7a.

Exhibit 7a — Direct economic impacts



The **salmon farming** sector, including both aquaculture production and processing activities, accounted for $371 million in direct output and contributed $134 million to provincial GDP in 2005. The industry also provided an estimated 1,500 full-time equivalent jobs.

The **wild commercial salmon** sector, including both capture and processing activities, accounted for $216 million in direct output and $67 million in GDP. Salmon harvesting and salmon processing activities provided approximately 1,600 full-time equivalent jobs, mostly in processing. (In addition to processing BC-caught salmon, BC companies also process significant volumes of Alaska-caught salmon, accounting for 48% of salmon canned in BC in 2005[1].)

The **salmon sport fishing** sector accounted for approximately $231 million in output and contributed $116 million to provincial GDP, providing 2,280 full-time equivalent jobs.

[1] Source: 2005 BC Seafood Industry Year in Review. The BC Ministry of Environment, Oceans and Marine Fisheries Division estimates that imported Alaskan salmon accounted for $37 million of the wholesale value of wild salmon in 2005.

7.3.1 Detailed results

A table of more detailed results is presented in Exhibit 7b. In terms of total output and GDP, the farmed salmon industry is largest (45% of total output) among the three industries, although the combined output of the wild salmon-based industries is larger.

In terms of employment, the sport fishing industry is largest, reflecting the labour-intensive nature of much of this industry.

Exhibit 7b — Detailed results

	Total output	Direct GDP[1]	Direct Government Revenues[1]	Industry employment[3] (person-years)
	($ million)	($ million)	($ million)	(FTEs)
A. Salmon farming[1]				
• Farmgate values	$318[1]			850
• Processed values	$371[1]	$134	$25	650
	(45%)	(42%)		1,500
				(28%)
B. Wild salmon sectors				
• Wild commercial salmon[1]				
- Landed values	$33[1]			300
- Processed values	$216[1]	$67	$4	1,307
	(26%)	(21%)		1,607
				(30%)
• Salmon sport fishing	$231[2]	$116	$37	2,280
				(42%)
• Wild salmon sectors combined	$447	$183	$41	3,887
	(55%)	(58%)		(72%)
Total all industries	$818	$317	$66	5,387
	(100%)	(100%)		(100%)

Totals may not add exactly due to rounding.

1 Source: BC MoE "2005 BC Seafood Industry Year in Review", plus special data runs performed for this project, plus economic multipliers and other values from BCIOM.

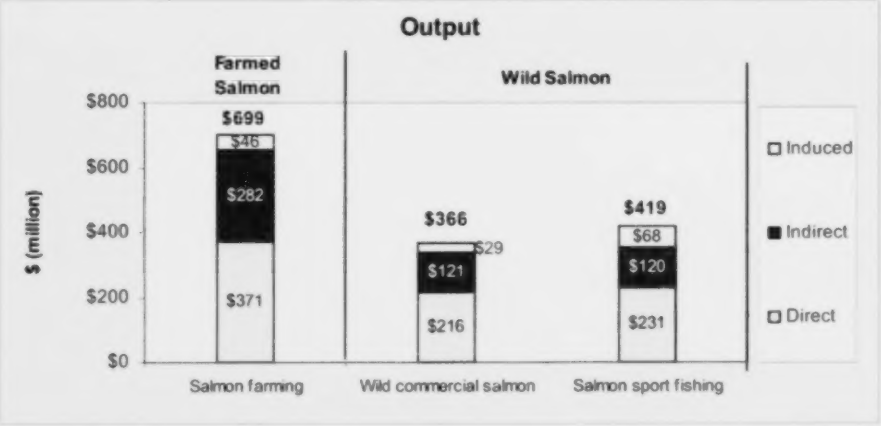
2 Source: Saltwater sport fishing output estimated for 2001 by BC Stats at $341 million for all species, times 63.5% (DFO survey of portion of fishing effort on salmon vs. other species), inflation-adjusted to 2005 (+6.7%).

3 Employment figures based on combination of direct estimates and BCIOM data. See detailed discussion in Appendix A.

7.4 Direct, indirect and induced benefits

The estimated indirect and induced impacts associated with each sector are illustrated graphically in Exhibit 7c, and also presented numerically in Exhibit 7d. These figures are generally based on BCIOM multipliers, with adjustments to reflect the specific scope of this study (i.e. to count both harvesting/growout and processing operations as direct economic impacts).[1]

Exhibit 7c — Direct, indirect and induced benefits



...continued

[1] For the purpose of this study, we have defined the direct impacts of the salmon farming industry sector as encompassing all activities related to the grow-out and processing of farmed salmon. Similarly, we have defined the wild commercial fishing industry sector as encompassing both harvesting and processing activities, including the processing of imported Alaskan salmon in BC.

These industry definitions are not entirely consistent with the industry categories reflected in the BCIOM. The BCIOM multipliers are calculated by Statistics Canada from data obtained through a variety of sources available to that agency (including tax returns and T4s). The industries defined by the model correspond to NAICS (North American Industry Classification System) groupings. The multipliers chosen to estimate indirect and induced impacts correspond to the NAICS industry to which revenues from the sale of salmon accrue.

In the salmon farming industry, revenues from the sale of farmed salmon generally accrue to the farm licence-holder. Where processing operations are contracted, this employment may not be reported as direct by the farm licence-holder, and thus may be treated by the BCIOM model as indirect. For the purposes of this study, we have treated this employment as direct employment by reclassifying some BCIOM-estimated indirect employment as direct. (See Appendix A for further details.)

In the wild salmon commercial fishing industry, revenues from the sale of processed salmon accrue to the fish processing industry. Harvesting operations are viewed by the BCIOM as suppliers to the fish processing industry and their activity is also reflected in terms of indirect impacts. However, for the purpose of this study, we have treated fishing employment as direct employment. (See Appendix A for further details.)

Exhibit 7c — Direct, indirect and induced benefits (continued)

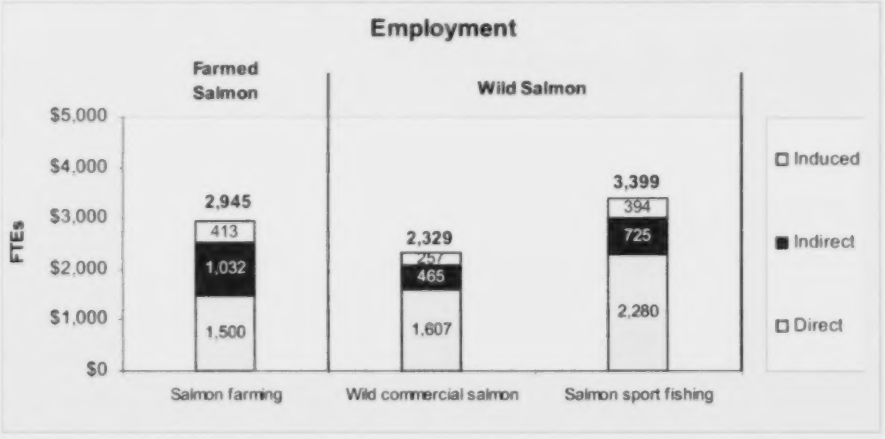


Exhibit 7c illustrates that employment multipliers effects are significant for all industry sectors. They tend to be strongest in the salmon farming industry, especially with respect to indirect employment generated by service providers to this industry.

Exhibit 7d also illustrates results for each industry, in terms of value added (GDP) per full-time equivalent (FTE) employee. Average value added per FTE is highest for the salmon farming industry ($86,000), followed by salmon sport fishing ($62,000) and wild commercial salmon ($53,000).

Exhibit 7d — Direct, indirect and induced benefits, with multiplier effect[1]

	Output	GDP	Government revenues	Employment[2]	GDP per FTE
	($million)	($million)	($million)	(FTEs)	($000s)
A. Salmon farming					
• Direct (grow-out & proc.)	$371	$134	$25	1,500	$89
• Indirect (incl. hatcheries)	$282	$92	$14	1,032	
• Induced	$46	$26	$6	413	
	$699	$252	$45	2,945	$86
"Multiplier effect"[3]	88%	88%	80%	96%	
B. Wild salmon sectors					
1. Wild commercial salmon					
• Direct (capture & proc.)	$216	$67	$4	1,607	$42
• Indirect:	$121	$41	$7	465	
• Induced	$29	$16	$6	257	
	$366	$124	$17	2,329	$53
"Multiplier effect"[3]	69%	85%	-[4]	45%	
2. Sport fishing					
• Direct	$231	$116	$37	2,280	$51
• Indirect	$120	$58	$12	725	
• Induced	$68	$38	$7	394	
	$419	$212	$56	3,399	$62
"Multiplier effect"[3]	81%	83%	51%	49%	
3. Wild salmon sectors combined					
• Direct	$447	$183	$41	3,887	$47
• Indirect	$241	$99	$19	1,190	
• Induced	$97	$54	$13	651	
	$785	$336	$73	5,728	$59
"Multiplier effect"[3]	76%	84%	78%	47%	

Totals may not add exactly because of rounding.

1 Source: 2005 BC Seafood Industry Year in Review, plus BCIOM model runs and economic multiplier values, except as noted.

2 Adjustments to BCIOM - derived figures as described in Appendix A.

3 Percentage by which total impacts (direct, indirect and induced) exceed direct impacts.

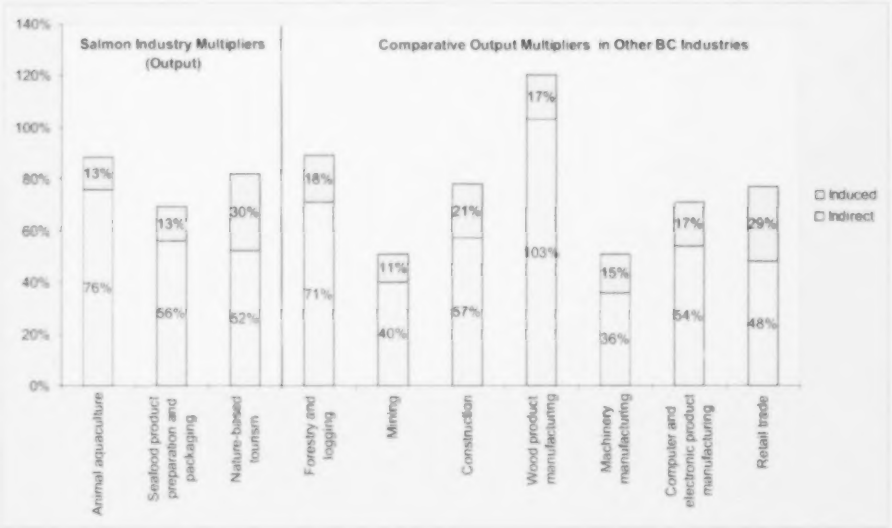
4 Calculation not meaningful (number too small).

7.4.1 Comparison with other industry multipliers

Exhibit 7e illustrates the standard BCIOM multipliers for the BCIOM industry segments most closely related to the three industry segments[1], along with a sample of multipliers used in other industries.

[1] With the exception of sport fishing, for which multipliers were derived from Tourism BC studies. (See Appendices for details.)

Exhibit 7e
Sample of BCIOM industry multipliers



Salmon industry multipliers generally fall into the mid-range in terms of multiplier effects, compared with representative other BC industries.

7.5 Trends 1997 – 2005

Economic trend indicators between 1997 and 2005 are illustrated in Exhibit 7f:

- The **salmon farming** industry nearly doubled its size between 1997 and 2005, both in terms of production volumes and output value.
- The economic size of the **wild commercial industry** declined significantly between 1997 and 2005, with total output values declining by more than 30%.
- For the **salmon sport fishery**, economic indicators show an overall decline in activity since 1997. However, the overall indicators mask very different regional trends:
  - Angler boat-trips in Georgia Strait declined by 68%, partly offset by increased angling activity in the Fraser River.
  - Activity levels and catches were strongly up on the West Coast of Vancouver Island, and in the North/Central Coast.

Exhibit 7f — Economic trends 1997 -2005

	1997	2005	Change
A. Salmon farming			
• Economic indicators (farmgate)			
- Farmgate production (R. tonnes 000s)	36.6	70.6	+93%
- Farmgate price per kg	$4.82	$4.51	-6%
• Economic impacts (processed)			
- Total output, processed ($M)	$190	$371	+95%
B. Wild salmon sectors			
1. Wild commercial salmon			
• Economic indicators			
- Number of fishing licenses	3,628	2,220	-39%
- Production (round tonnes 000s)	48.7	26.3	-46%
- Price per kg	$2.25	$1.25	-45%
• Economic impacts			
- Total output, processed ($M)	$312	$216	-31%
2. Salmon sport fishing			
• BC-wide indicators			
- Number of fishing licenses (000s)[1]	351.1	276.8	-21%
- Total catches (000s fish)[2]	900.3	541.4	-40%
- Angling activity (000s boat trips)[3]	474.6	216.9	-54%
- Saltwater sport fishing revenues (all species - $M)[4]		$341	n/a
• Regional indicators[4]			
- Georgia Strait (000s angler boat trips)	430	139	-68%
- West Coast Vancouver Island (000s angler boat trips)	44	79	+77%
- North/Central Coast (000s salmon)	85	168	+96%
- Fraser River (000s salmon)	12	66	+428%

1 Because of data unavailability for 1997, economic indicators for sport fishing are based on comparing trends between 1992-95 and 2002-05.
2 Total catches for 1997 excludes Johnstone Strait.
3 Comparable data only available for the Georgia Strait and West Coast (Vancouver Island).
4 Source: BC Stats 2002 study. Estimated for 2005 are inflation-adjusted 2001 figures.
5 BC Stats estimates 2001 saltwater sport fishing output at $341 million for all species, times 63.5% (DFO survey of portion of fishing effort on salmon vs. other species), plus inflation adjustment (6.7%).

PART II

REGIONAL ANALYSIS

The economic significance of each salmon industry sector varies by region within the province.

In this section, we explore the significance of the salmon industry sectors activities in the context of key regional economies. Industry and economic data were assembled and analyzed at a regional level, dividing the BC coast and Vancouver Island into five regions comprised of Regional District groupings. (Regional District groupings were determined based on both geographic proximity and the necessity to respect privacy issues in obtaining regional statistical industry data.)

This section chapters include:

- **Chapter 8: Region #1 - South and West Vancouver Island:**
  - Alberni-Clayquot and Capital
- **Chapter 9: Region #2 - Fraser River & GVRD**
  - Greater Vancouver and Fraser Valley
- **Chapter 10: Region #3 - North Vancouver Island to Georgia Strait**
  - Sunshine Coast, Powell River, Comox-Strathcona
  - Nanaimo, and Mt. Waddington
- **Chapter 11: Region #4 - Central Coast**
  - Kitimat-Stikine and Central Coast
- **Chapter 12: Region #5 - North Coast**
  - Skeena-Queen Charlotte
- **Chapter 13: Summary Comparisons of Regions**

8. Region #1: South and West Vancouver Island

8.1 Area and population

This Region encompasses the southern and western coasts of Vancouver Island, as well as the southern Gulf Islands, as illustrated in Exhibit 8a.

Exhibit 8a — Region #1 Regional District Maps

Source: BC Stats

2005 Population

Alberni-Clayquot	32,692	Capital	351,022
Port Alberni	18,688	Saanich	110,387
Ucluelet	1,900	Victoria	77,369
Tofino	1,846	Sidney	11,862
Rest	10,258	Sooke	10,117
		Rest	141,287
% BC	0.8	% BC	8.3

8.2 Economic base

The socioeconomic characteristics of these two regional districts are distinct. The Capital Regional District is economically diverse and represents more than eight percent of the BC population, while Alberni-Clayquot has less than 1% of the BC population.

Income dependency is a measure of the extent to which personal incomes depend on the economic activity of a specific industry. BC Stats has prepared income dependency profiles for the province based on 2001 census data, highlighting those industries of greatest significance to personal incomes in each regional district.

The income dependency profiles for Alberni-Clayquot and Capital are summarized in Exhibit 8b.

Exhibit 8b — Region #1 income dependencies (2000)

Alberni-Clayquot		Capital	
Forestry	31%	Public Sector	40%
Public Sector	22%	**Tourism**	**6%**
Tourism	**8%**	Forestry	1%
Fishing and Trapping	**2%**	**Agriculture**	**1%**
Agriculture	**2%**	**Fishing and Trapping**	**<0.5%**

In Alberni-Clayquot, almost one third of personal income depends on activities in the forest sector. The public sector is also highly significant with 22% of income dependency. Fishing and trapping, which primarily represents commercial fishing-related activities[1] (fishing and fish processing, including salmon) has an income dependency of only 2%. Agriculture, which includes all aquaculture activities, also has an income dependency of 2%. Tourism, which includes the salmon sport fishing industry, has an income dependency of 8%.

In Capital, government activities account for the greatest share of personal income. Given the population base and the economic diversity of the area, neither fishing nor aquaculture account for a significant share of personal incomes. Incomes dependent on Tourism amount to approximately 6%.

8.3 Regional economic importance of salmon farming

There are 25 marine finfish farms in Region #1 (22 in Alberni-Clayquot, and three in Capital).[2] In 2005, this region's salmon aquaculture farms harvested 14,840 tonnes of salmon, 21% of the provincial total volume harvested. The farmgate value of the harvest was $73.3 million.[3]

Major aquaculture producers operating in this region are listed in Exhibit 8c.

Exhibit 8c — Region #1 Aquaculture producers

Company	Sites in this Region	Other local economic relationships
Mainstream Canada	16	Administrative office in Tofino Processing in Tofino
Creative Salmon Company	6	Administrative office in Tofino Processing in Tofino
Marine Harvest Canada	1	
Pan Fish Canada	1	
Other companies	1	

[1] BC Stats indicates that trapping activity is negligible in BC.

[2] BC Ministry of Agriculture and Lands, August 2006. See also Appendix B.

[3] Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries. 2006.

In addition, five companies in this region reported processing 3,088 tonnes of farmed salmon, with a wholesale value estimated at $24.3 million. Salmon farming and processing activities values for this region are summarized in Exhibit 8d. From the values reported, it is clear that much of the salmon harvested in this region was processed in another region.

Exhibit 8d — Region #1 salmon farming activity in 2005[1]

	Tonnes	($'000)	
Farmed salmon harvested	14,840 (round)	$73,285	Farmgate
Farmed salmon processed	3,088 (processed)	$24,259	Wholesale

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

Based on these production levels, the salmon aquaculture industry is estimated as supporting approximately 174 full-time equivalent jobs in farm-based activities, and 32 full-time equivalent jobs in processing activities.[1]

8.4 Regional economic importance of the wild commercial salmon industry

8.4.1 Wild salmon harvesting

Revenues from the sale of wild salmon harvested by BC fishers accrue to license holders, with a share of the proceeds used to pay vessel skipper and crew. Appendix C describes the detailed assumptions and calculations made to estimate the regional allocation of harvesting revenues.

Wild salmon harvesting revenues are estimated as $5.5 million in 2005 for Region 1. The harvesting industry is estimated to support approximately 45 full-time equivalent jobs[2].

8.4.2 Wild salmon processing

In 2005, 20 companies reported processing only 394 tonnes of wild salmon. These companies are small, and many are involved in processing other types of seafood products.

The wholesale value of wild salmon processed in this region is summarized in Exhibit 8e.

Exhibit 8e — Region #1 wholesale value of wild salmon processed[1]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Wild salmon processed	394	$4,419	20

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

Exhibit 8f lists the major employers in the region involved in salmon processing.

[1] See Appendices A & B for detailed calculations.

[2] See Appendices A & C for detailed calculations.

Exhibit 8f — Major employers in salmon processing in Region #1

Company	Salmon Processed		Plant location	Employment[1]
	Wild	Farmed		
Albion Fisheries Ltd.	yes	yes	Victoria	55
Blue Tornado Enterprises Inc.	yes	no	Sooke	21-50
Lions Gate Fisheries Ltd.	yes	yes	Tofino	30
Pacific Seafoods International Ltd.	yes	no	Sidney	21-50
SeaPrime Seafood Inc.	no	yes	Tofino	21-50

1 May include full and part-time, salmon and other seafood products.

Some of these companies are also involved in processing other species of seafood. Employment attributable to wild salmon processing is estimated as 13 full-time equivalent jobs. Detailed calculations and assumptions regarding this estimate are provided in Appendix C.

8.5 Regional economic impact of sport salmon fishing

The regional estimates of salmon sport fishing revenues and employment are based on DFO fishing activities, plus previous direct estimates of regional employment. Detailed analysis and calculations are contained in Appendix D.

Based on this analysis, regional economic impacts of sport salmon fishing based activities are as follows:

- **Total output**. Total regional salmon sport fishing expenditures are estimated to be $61.5 million in 2005, 27% of the BC total.

  Employment. Employment in the salmon sport fishery is estimated as 609 FTEs in Region 1.

8.6 Summary of economic impacts – Region #1

Although salmon-based activities in this region represent a relatively small portion of the total economic base, they do support substantial employment and contribute to the local community economies. The economic analysis for this Region is summarized in Exhibit 8g.

Exhibit 8g — Summary of 2005 Estimates of Regional Economic Significance of Salmon

Industry Segment (2005)	Direct Output ($'000)[1]	Direct Employment (FTE)
Salmon Aquaculture	73,285	174
• Salmon Processing (Farmed)	24,260	32
		206
Commercial Wild Salmon Fishery	5,510	45
• Salmon Processing (Wild)	4,419	13
		58
Salmon Sport Fishing	61,549	609
Total Employment - All		873
Experienced Labour Force (2001)		185,125
% of Experienced Labour Force in Region #1		0.47%

1 Direct output numbers should not be added (to avoid double-counting).

For Region #1, the value of output from salmon aquaculture production is the highest among the industry segments. However, the salmon sport fishing industry is responsible for the greatest share of regional employment.

8.7 Industry trends since 1997

8.7.1 Salmon farming and processing

Trends in salmon aquaculture are illustrated in Exhibit 8h. Since 1997, salmon aquaculture activities have more than doubled.

At the same time, activities involving processing of farmed salmon in this region have declined. Nine companies reported processing 6,949 tonnes of farmed salmon in 1997, while five companies reported processing 3,088 tonnes of farmed salmon in 2005, as processing has moved to other regions.

Exhibit 8h — Trends in salmon aquaculture 1997 and 2005[1]

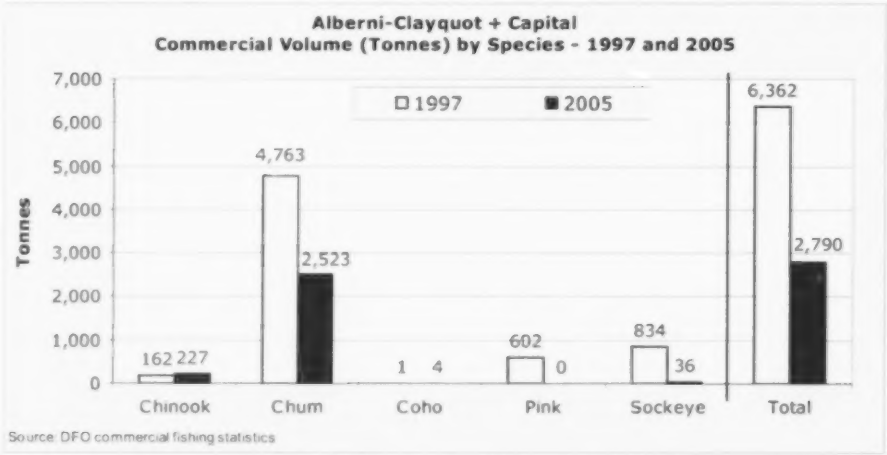
	1997	2005	% Change
Farmed salmon harvested			
Quantity (tonnes)	6,668	14,840	123%
Farmgate Value ('000)	$38,756	$73,285	189%
Farmed salmon processed			
Quantity (tonnes)	6,949	3,088	-56%
Wholesale Value ('000)	$48,242	$24,259	-50%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

8.7.2 Wild commercial salmon industry trends

As illustrated in Exhibit 81, volume of wild salmon harvested from adjacent waters declined by more than 58%, between 1997 and 2005, from 6,362 to 2,790 tonnes, as indicated in Exhibit 8i.

Exhibit 8i — Trends in the commercial salmon harvest from adjacent waters 1997 and 2005



While local harvest volumes dropped, the total volume of wild salmon processed in the region increased from 234 tonnes in 1997 to 394 tonnes in 2005, as presented in Exhibit 8j. These volumes are small in relation to other regions.

Exhibit 8j — Trends in wild salmon processing 1997 and 2005[1]

Wild salmon processed	1997	2005	% Change
Quantity (tonnes)	234	394	68%
Wholesale Value ('000)	$1,989	$4,419	122%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

These volumes include salmon imported for processing in BC. The number of companies reporting processing wild salmon has also increased from 12 to 20, and the wholesale value of processed wild salmon increased $1.99 million to $4.42 million.

8.7.3 Salmon sport fishing

Exhibit 8k illustrates the trends in salmon sport fishing in Region #1.

Exhibit 8k — Trends in the recreational salmon fishing sector 1997 and 2005[1]
Number of fishing boat trips

	1997	2005	% Change
• West Coast Vancouver Island			
- Onshore[1]	32,964	14,608	-56%
- Offshore[2]	58,165	50,767	-9%
• Capital & Southern Gulf islands[3]	n/a	15,034	-

1 DFO management Areas 20-24 (Map in Appendix D)
2 DFO Management Areas 121-124 (Map in Appendix D)
3 DFO Management Areas 18 and 19 (Map in Appendix D)

9. Region #2: Fraser River & GVRD

9.1 Area and population

This region encompasses the Lower Mainland municipalities along the Fraser River from the GVRD eastward past Hope, as illustrated in Exhibit 9a.

Exhibit 9a — Region #2 Regional District Maps

Source: BC Stats

2005 Population

GVRD	2,155,880	Fraser Valley	351,022
Vancouver	583,267	Abbotsford	127,434
Surrey	393,137	Chilliwack	70,522
Burnaby	204,324	Mission	34,742
Richmond	173,430	Hope	6,591
Rest	801,722	Rest	111,733
% BC	50.7	% BC	6.2

9.2 Economic base

These two Regional Districts combine to make up over half the population of BC. They have highly diversified economies. Also, many of the larger harvesting, processing and recreational fishing businesses that have operations in other parts of the province also have either an office presence or their base operations located here.

The income dependency profiles for the GVRD and Fraser Valley are summarized in Exhibit 9b.

Exhibit 9b — Region #2 income dependencies (2000)

GVRD		Fraser Valley	
Public Sector	27%	Public Sector	27%
Tourism	5%	Forestry	8%
Forestry	3%	Tourism	3%
Agriculture	**2%**	**Agriculture**	**8%**
Fishing and Trapping	**0%**	**Fishing and Trapping**	**<0.5%**

In both GVRD and the Fraser Valley, the public sector represents the most significant source of personal income at 27%. Although agriculture figures prominently in both areas, these values reflect dependencies on land-based agriculture, since there are no salmon farming operations in the region. Income dependencies related to fishing and trapping are less than half of one percent.

9.3 Regional economic importance of salmon farming

There are no marine finfish farms in Region #2[1]. However, 23 companies reported processing 14,693 tonnes of farmed salmon in this region. The wholesale value of farmed salmon processed in this region is summarized in Exhibit 9c.

Exhibit 9c — Region #2 wholesale value of salmon processed[1]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Farmed salmon processed	14,693	$108,713	23

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries..

The salmon farming (processing) industry is estimated to have provided approximately 155[2] FTEs of employment in 2005 in Region #2.

9.4 Regional importance of the wild commercial salmon industry

9.4.1 Wild salmon harvesting

The Fraser River is an important salmon harvesting area. The fishery occurs in tidal waters from the mouth of the river, upstream to the Mission bridge. Gill net fishing is the most common gear for fishing this area. The fishery runs primarily during the summer months.[3]

Revenues from commercial salmon fishing activities received by entities in Region #2 are estimated to be approximately $9.6 million in 2005, creating 93 FTEs of employment[4].

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[1] BC Ministry of Agriculture and Lands, August 2006.

[2] See Appendix B for detailed calculation.

[3] Source: DFO Extranet, Commercial Fisheries.

[4] See Appendix C for detailed calculation.

9.4.2 Wild salmon processing

In 2005, 74 companies reported processing 32,860 tonnes of wild salmon, with a wholesale value of $159.9 million — approximately three-quarters of all salmon processed in BC. The wholesale value of wild salmon processed in this region is summarized in Exhibit 9d.

Exhibit 9d — Region #2 wholesale value of salmon processed[1]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Wild salmon processed	32,860	$159,944	74

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

Exhibit 9e lists the major employers in the region involved in salmon processing. Most fish processing facilities in this region are involved in wild commercial salmon processing.

Exhibit 9e — Major employers in salmon processing in Region #2

Company	Salmon Processed		Plant location	Employment[1]
	Wild	Farmed		
Canadian Fishing Company	yes	no	Vancouver	1,000
Albion Fisheries Ltd	yes	yes	Vancouver	180
Lions Gate Fisheries Ltd.	yes	yes	Vancouver	100-200
Harbour Marine Products	yes	no	Vancouver	40-150
JS Mcmillan Fisheries Ltd.	yes	no	Vancouver	200
Ocean Fisheries Ltd.	yes	no	Richmond	100+
Blundell Seafoods	yes	no	Richmond	100+
Coastwide Fishing Ltd.	yes	no	Richmond	51-100
Hi-To Fisheries	yes	no	Richmond	51-100

1 Includes seasonal employment and other seafood processing.

Employment in wild salmon processing is estimated as 993 full-time equivalent jobs. Detailed calculations and assumptions regarding these estimates are provided in Appendix C.

9.5 Regional economic impacts of sport salmon fishing

Region 2 includes recreational fishing areas in the tidal waters of the Fraser River and its tributaries, as well as for GVRD. This region not only provides prime fishing locations for anglers, it is adjacent to the largest concentration of population in the province.[1]

The salmon sport fishing revenues and employment in Region #2 are estimated as follows:

- **Total output.** The total economic benefit to this region of recreational salmon fishing-related expenditures is estimated to be $71.2 million in 2005.

[1] See Appendix D for details.

- **Employment.** Approximately 704 person years of employment are generated for residents of Vancouver and other parts of the Lower Mainland.

Detailed calculations are provided in Appendix D.

9.6 Summary of economic impacts – Region #2

As illustrated in Exhibit 9f, salmon processing (farmed and wild) is significant in this region. The value of the salmon sport fishery is also significant, reflecting this region's high population.

The wild salmon fishery provides a relatively small number of direct jobs, despite the large number of salmon licenses held in the region. This result reflects the relatively small catch volumes taken from adjacent waters and the tendency for vessels with locally held licenses to travel to all parts of the coast to fish, often contracting with skippers and crews based elsewhere.

Exhibit 9f — Summary of 2005 estimates of regional economic importance of salmon

Industry Segment (2005)	Direct Output ($'000)[1]	Direct Employment (FTE)
Salmon Aquaculture	0	0
• Salmon Processing (Farmed)	108,713	155
		155
Wild Salmon Fishery:	9,624	93
• Salmon Processing (Wild)	159,944	993
		1086
Recreational Fishing Industry	71,231	704
Total Employment		1,945
Experienced Labour Force (2001)		1,165,565
% of Experienced Labour Force in Region #2		0.2%

1 Direct output numbers should not be added (to avoid double-counting).

9.7 Industry trends since 1997

9.7.1 Salmon farming and processing

While Region #2 has no salmon farms, salmon aquaculture processing activity has increased substantially since 1997. As illustrated in Exhibit 9g, volumes and wholesale values have more than tripled, as more farmed salmon are being brought to the Lower Mainland for processing and shipment to the US.

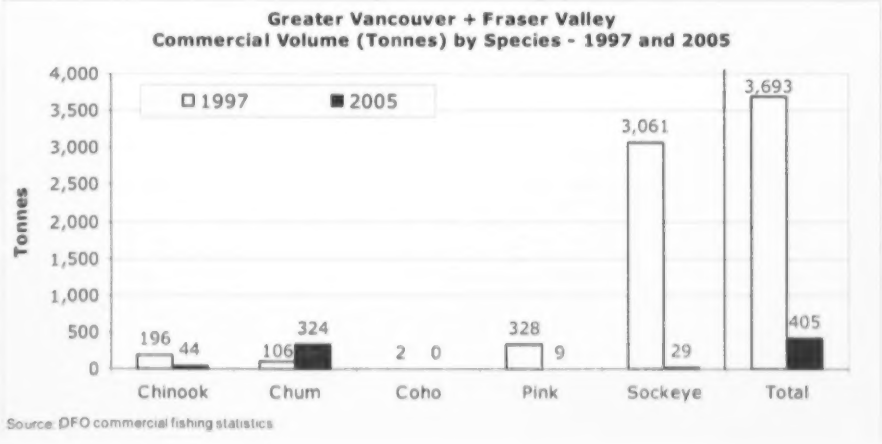
Exhibit 9g — Trends in salmon aquaculture 1997 and 2005[1]

	1997	2005	% Change
Farmed salmon harvested			
Quantity (tonnes)	0	0	0%
Farmed salmon processed			
Quantity (tonnes)	4,555	14,693	323%
Wholesale value ('000)	$34,829	$108,713	312%

9.7.2 Wild commercial salmon capture and processing

The volume of wild salmon harvested from waters adjacent to this Region decreased by nearly 90% between 1997 and 2005, as indicated in Exhibit 9h. This trend is due primarily to the virtual elimination of sockeye from the catch profile.

Exhibit 9h — Trends in the wild commercial salmon harvest from adjacent waters 1997 and 2005



[1] Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

The total volume of wild salmon processed in the region also decreased by 11%, from 36,991 tonnes in 1997 to 32,860 tonnes in 2005. These volumes include salmon imported for processing in BC. The wholesale value of processed wild salmon in this Region decreased 32% from 1997 to 2005, reflecting the weak market conditions and loss of the higher-value sockeye.

Exhibit 9i — Trends in wild commercial salmon processing 1997 and 2005[1]

Wild salmon processed	1997	2005	% Change
Quantity (tonnes)	36,991	32,860	-11%
Wholesale Value ('000)	$235,500	$159,944	-32%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

9.7.3 Salmon sport fishing

As illustrated in Exhibit 9j, salmon sport fishing in the Georgia Strait (adjacent to Vancouver) has declined between 1997 and 2005, although this decrease in angling activity has been partly offset by increased activity in the Fraser River.

Exhibit 9j — Trends in the recreational salmon fishing sector 1997 and 2005[1]

	1997	2005	% Change
• Fraser River (# of angling hours)	260,874	439,876	+69%
• Georgia Strait[2] (# of boat trips)	268,795	67,375	-75%

Source: DFO recreational statistical data.
1 See also discussion in Chapter 5.
2 DFO Management Areas 28 & 29.

The increase in activity in the Fraser River is due in large measure to new rules in the late 1990's that allowed for increased recreational fishing of sockeye in the Fraser River and its tributaries.

10. Region #3: North Vancouver Island to Georgia Strait

10.1 Area and population

Region #3 encompasses the northwestern corner of Vancouver Island, across the tip and down the Inside Passage to the borders of study Regions #1 and #2. Regional District maps are shown in Exhibit 10a.

Exhibit 10a — Region #3 Regional District Maps

Source: BC Stats

2005 Population

Mt. Waddington	13,684	Comox-Strathcona	105,327
Port Hardy	4,597	Campbell River	30,810
Port McNeill	2,928	Courtenay	21,801
Port Alice	1,128	Comox	12,853
Rest	5,031	Rest	39,881
% BC	0.3	% BC	2.5
Powell River	21,114	Nanaimo	141,080
Powell River	13,831	Nanaimo	79,626
Rest	7,283	Parkville	11,709
		Qualicum Beach	8,807
		Rest	40,938
% BC	0.5	% BC	3.3
Sunshine Coast	28,557	Total Region	309,762
Sechelt	8,901		
Gibsons	4,349		
Rest	15,307		
% BC	0.7	% BC	7.3

10.2 Economic base

The income dependency profiles for each Regional District in Region #3 are summarized in Exhibit 10b. Fishing and Trapping are relatively significant in income dependency (greater than 1%) across most of the Region, especially in Mt. Waddington, relative to the BC average.

Agriculture, which includes aquaculture, in linked to approximately 3% of incomes in Comox-Strathcona. The vast majority of aquaculture sites in BC are situated within the Regional District boundaries of Mt. Waddington and Comox-Strathcona, particularly in the Broughton Archipelago. The Sunshine Coast is also an important region for this industry.

Tourism income dependency mirrors the provincial average of 6%.

Exhibit 10b — Region #3 income dependencies (2000)

Mt. Waddington		Comox-Strathcona	
Forestry	44%	Public Sector	26%
Public Sector	21%	Forestry	18%
Tourism	**8%**	**Tourism**	**7%**
Fishing and Trapping	**6%**	**Agriculture**	**3%**
Agriculture	**2%**	**Fishing and Trapping**	**2%**

Powell River		Nanaimo	
Forestry	27%	Public Sector	25%
Public Sector	19%	Forestry	10%
Tourism	**5%**	**Tourism**	**5%**
Agriculture	**1%**	**Agriculture**	**1%**
Fishing and Trapping	**1%**	**Fishing and Trapping**	**1%**

Sunshine Coast	
Public Sector	20%
Forestry	19%
Tourism	**5%**
Fishing and Trapping	**2%**
Agriculture	**1%**

10.3 Regional economic importance of salmon farming

There are 94 marine finfish farms in Region #3[1], as listed in Exhibit 10c, representing three-quarters of the provincial total.

Exhibit 10c — Region #3 Aquaculture producers

Company	Sites in this Region	Other local economic relationships
Marine Harvest Canada	40	Administrative offices in Campbell River
Pan Fish Canada	24	Administrative offices in Campbell River; processing in Port Hardy
Mainstream Canada	12	Administrative offices in Port McNeil and Campbell River
Target Marine Products	8	Administrative offices in Sechelt; processing in Sechelt
Grieg Seafood BC	8	Administrative offices in Campbell River
Other companies	2	

[1] BC Ministry of Agriculture and Lands.

As illustrated in Exhibit 10d, this region's salmon aquaculture farms harvested 55,500 tonnes of salmon in 2005, 79% of the provincial total. The farmgate value of the harvest was $245 million.[1] In addition, 13 companies reported processing 42,403 tonnes of farmed salmon in this region, representing a wholesale value of $238 million.

Exhibit 10d — Region #3 salmon farming activity in 2005[1]

	Tonnes	($'000)	
Farmed salmon harvested	55,500 (round)	$244,911	Farmgate
Farmed salmon processed	42,403 (processed)	$238,114	Wholesale

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

The salmon aquaculture industry supported approximately 651 full-time equivalent jobs in farm-based activities and 445[2] full-time equivalent jobs in processing activities.

10.4 Regional economic importance of the wild commercial salmon industry

10.4.1 Wild salmon harvesting

The wild commercial salmon fishery figures prominently in this Region. Johnstone Strait is a major harvesting site for Fraser sockeye as they migrate south. Other Fraser bound salmon are fished in Mainland inlets (e.g. Kingcome Inlet, Wakeman Sound, Bond Inlet and Knight Inlet).

Revenues from commercial salmon fishing activities received by entities in Region #3 were estimated to be approximately $11.9 million in 2005. This value represents this Region's share of the total landed value of wild salmon in BC in 2005. The harvesting industry supported approximately 111 full-time equivalent jobs[3].

10.4.2 Wild salmon processing

In 2005, 25 companies reported processing 2,229 tonnes of wild salmon. The wholesale value of wild salmon processed in this region is summarized in Exhibit 10e.

Exhibit 10e — Region #3 wholesale value of salmon processed[1]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Wild salmon processed	2,229	$10,977	25

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

[1] Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

[2] See Appendix B for detailed calculation.

[3] See Appendix C for detailed calculation.

Exhibit 10f lists some major employers in the region involved in salmon processing.

Exhibit 10f — Major employers in salmon processing in Region #3

Company	Salmon Processed		Plant location	Employment[1]
	Wild	Farmed		
Browns Bay Packing	No	Yes	Campbell R.	130-200
Agri-Marine Processing	Yes	No	Campbell R.	51-100
Keltic Seafoods	Yes	No	Port Hardy	84
Hardy Buoys Smoked Fish	Yes	Yes	Port Hardy	2-20
French Creek Seafood	Yes	No	Parksville	21-50

1 Includes seasonal employment and other seafood processing.

Employment generated by wild salmon processing is estimated as 66 full-time equivalent jobs[1].

10.5 Regional importance of salmon sport fishing

Region 3 includes recreational fishing areas of the northwest and northeast shores of Vancouver Island, as well as the adjacent Mainland.

Regional economic impacts of sport salmon fishing based activities are as follows:

- **Total output.** The value of salmon sport fishing expenditures is estimated to be $58.1 million in 2005.
- **Employment.** This region is estimated as providing approximately 574 person years of employment in the salmon sport fishing industry involving residents of upper west coast, north and mid-Vancouver Island and the Sunshine Coast.

Detailed calculations are provided in Appendix D.

10.6 Summary of economic impacts – Region #3

The economic importance of the three salmon industries in this Region is summarized in Exhibit 10g.

[1] See Appendix B for detailed calculation.

Exhibit 10g — Summary of 2005 estimates of regional economic importance of salmon

Industry Segment (2005)	Direct Output ($'000)[1]	Direct Employment (FTE)
Salmon Aquaculture	244,911	651
• Salmon Processing (Farmed)	238,114	445
		1096
Wild Salmon Fishery	11,886	111
• Salmon Processing (Wild)	10,977	66
		177
Recreational Fishing Industry	58,091	574
Total Employment		1,847
Experienced Labour Force (2001)		134,815
% of Experienced Labour Force in Region #2		1.4%

1 Direct output numbers should not be added (to avoid double-counting).

Salmon aquaculture production and processing dominate this region in terms of the role of salmon in the regional economy, both in terms of output and employment.

10.7 Industry trends since 1997

10.7.1 Salmon farming and processing

As illustrated in Exhibit 10h, salmon farming and processing activity approximately doubled between 1997 and 2005.

Exhibit 10h – Trends in salmon aquaculture 1997 and 2005[1]

	1997	2005	% Change
Farmed salmon harvested			
Quantity (tonnes)	29,866	55,464	86%
Farmgate Value ('000)	$137,778	$244,911	78%
Farmed salmon processed			
Quantity (tonnes)	21,442	42,403	98%
Wholesale Value ('000)	$106,472	$238,114	124%

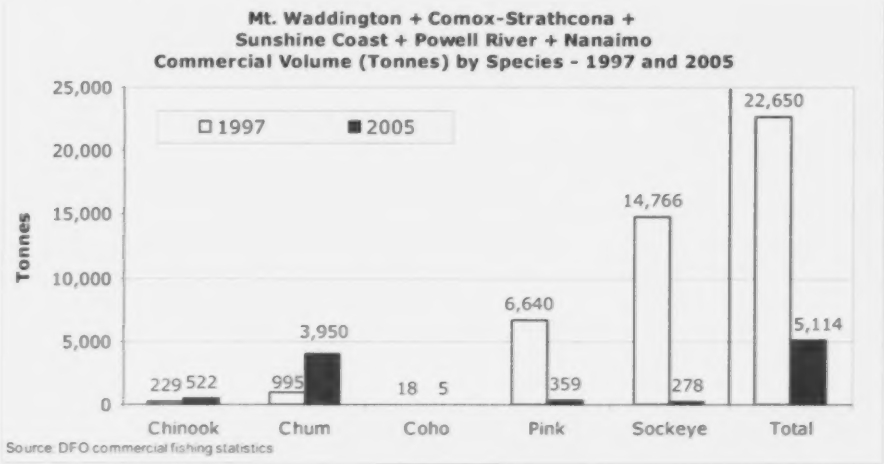
1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

Final figures for 2006 are expected to be approximately 15-20% higher than those for 2005.

10.7.2 Wild commercial salmon harvest and processing

As illustrated in Exhibit 10i, the volume of wild salmon harvested from waters adjacent to this Region declined more than 77% between 1997 and 2005. This trend is due to significant declines in the catch of both pink and sockeye.

Exhibit 10i — Trends in the commercial salmon harvest from adjacent waters 1997 and 2005



As illustrated in Exhibit 10j, the total volume of wild salmon processed in the region decreased from 3,369 tonnes in 1997 to 2,229 tonnes in 2005, while the wholesale value of processed wild salmon in this Region decreased from $22.5 to $11.0 million. The number of companies reporting processing wild salmon increased from 22 to 25.

Exhibit 10j — Trends in wild salmon processing 1997 and 2005[1]

Wild salmon processed	1997	2005	% Change
Quantity (tonnes)	3,369	2,229	-34%
Wholesale Value ('000)	$22,454	$10,977	-51%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

10.7.3 Salmon sport fishing

The salmon sport fishery has declined significantly over the past several years in Georgia Strait, at the south end of Region #3. As illustrated in Exhibit 10k, this trend is reflected in the 54% decrease in salmon-related recreational boat trips reported to DFO in adjacent waters.

Exhibit 10k — Trends in the recreational salmon fishing sector 1997 and 2005

	1997	2005	% Change
Recreational salmon fishing boat trips in waters adjacent to this sub-region[1]	162,942	75,793	-54%

Source: DFO recreational statistics.
1 See also discussion in Chapter 5.

11. Region #4: Central Coast

11.1 Area and population

This sparsely-populated region has a very small population and extends northward from Region #3 to the Kitimat River Watershed, as illustrated in Exhibit 11a..

Exhibit 11a — Region #2 Regional District Maps

Source: BC Stats

2005 Population

Kitimat-Stikine	42,919	Central Coast	3,904
Terrace	12,556		
Kitimat	10,587		
Rest	19,776		
% BC	1.0	% BC	0.1

11.2 Economic base

The Kitimat-Stikine economic base has a high percentage of income dependent on three main sectors: public sector, forestry and mining. Fishing and trapping represents only 1% of income and agriculture represents less than 0.5%. These values are summarized in Exhibit 11b.

Exhibit 11b — Region #4 income dependencies (2000)

Kitimat-Stikine		Central Coast
Public Sector	27%	*BC Stats has suppressed economic dependency data for this RD because of its small population size.*
Forestry	20%	
Mining	17%	
Tourism	5%	
Fishing and Trapping	**1%**	
Agriculture	**<0.5%**	

11.3 Regional economic importance of salmon farming

There are six marine finfish farms in Region #4.[1] These sites are all in the Klemtu area, and are all owned by Marine Harvest Canada. While these are active sites, no production was reported for 2005 from this region.

The absence of production data for this year is an anomaly attributable to the fact that a typical growing season is longer than one year. We are advised that the sites in operation were harvested in late 2004, and then not again until January 2006.

As illustrated in Exhibit 11c, grow-out aquaculture operations in this region support 18 farm staff and 7 harvest vessel staff, or 25 full-time equivalent jobs.

Exhibit 11c — Region #4 salmon farming producers

Company	Sites in this Region	Local economic relationships
Marine Harvest Canada[1]	6[2]	55 resident staff (mostly Kitasoo): - 18 FTE farm staff - 30 processing staff (7 mos/year) - 7 harvest vessel staff (Kitasoo-owned) Approximately 10 non-resident FTEs. Other financial benefits to Kitasoo (confidential).

1 Site specific information provided to us by Marine Harvest Canada.

2 Two new sites in application process, with two existing lease sites to be relocated further away from Bella Bella territory. Approximately 3-4 active at any given time.

The Kitasoo First Nation in Klemtu owns the operations involved in farmed salmon processing. Their facility employs 30 people over 7 months, or 18 full-time equivalent jobs.

[1] BC Ministry of Agriculture and Lands, August 2006.

11.4 Regional economic importance of the wild commercial salmon industry

11.4.1 Wild salmon harvesting

Revenues from commercial salmon fishing activities received by entities in Region #4 were estimated to be approximately $0.8 million in 2005, supporting approximately 15 full-time equivalent jobs[1].

11.4.2 Wild salmon processing

In 2005, 8 companies reported processing 368 tonnes of wild salmon. The wholesale value of wild salmon processed in this region is $1.2 million, as summarized in Exhibit 11d.

Exhibit 11d — Region #4 wholesale value of salmon processed[2]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Wild salmon processed	368	$1,210	8

The total volume of wild salmon processed in the Region is small and encompasses customized processing in support of the sport fishery. Employment is estimated at 13 full-time equivalent jobs[1].

11.5 Regional importance of sport salmon fishing

This Region has a relatively small sport salmon fishery. Approximately three thousand boat trips were reported to DFO in 2005.

Regional economic impacts of sport salmon fishing based activities are as follows:

- **Total output**. Total salmon sport fishing-related expenditures is estimated to be $2.1 million in 2005.
- **Employment.** Approximately 21 person years of employment in the salmon sport-fishing sector are estimated for this region.

11.6 Economic importance – Region #4

Estimates of regional economic importance are summarized in Exhibit 11e. Although the absolute values of output and employment related to salmon are small compared to the other more populous study Regions, employment estimates related to salmon represent a significant proportion of the total labour force at 4.9%.

The recreational salmon fishing sector accounts for the greatest share of employment, just ahead of the wild commercial sector.

[1] See Appendix C for detailed calculation.

[2] Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

Exhibit 11e — Summary of 2005 estimates of Regional economic importance

Industry Segment (2005)	Direct Output ($'000)	Direct Employment (FTE)
Salmon Aquaculture	0[1]	25
• Salmon Processing (Farmed)	0[1]	18
		43
Commercial Wild Salmon Fishery	783	15
• Salmon Processing (Wild)	1,210	13
		28
Recreational Fishing Industry	2,075	21
Total Employment		92
Experienced Labour Force (2001)		1,875
% of Experienced Labour Force in Region #4		4.9%

1 2005 was an anomalous year for Marine Harvest's Central Coast operations. Marine Harvest estimates "normal" annual production as 5.85 tonnes (2005 values of approximately $26 million).

11.7 Industry trends since 1997

11.7.1 Salmon farming and processing

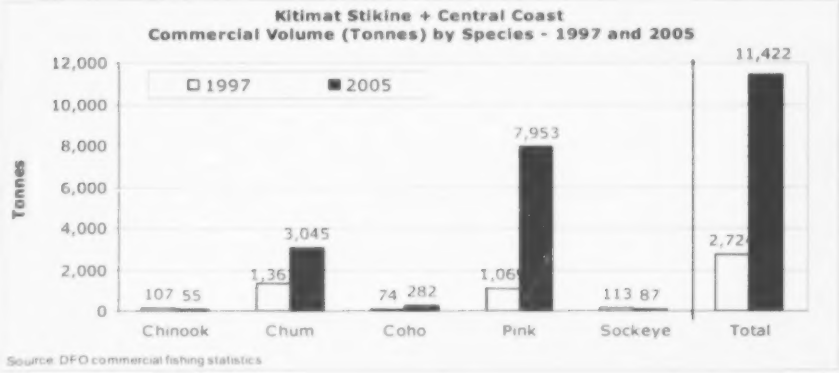
From 1987 to 1991, the Kitasoo First Nation operated a salmon farm in Klemtu. In 1999, the Kitasoo entered into a partnership with Marine Harvest Canada, and harvesting and processing began again in 2000.

11.7.2 Wild commercial salmon capture and processing

Trends in the wild capture sector are as follows:

- **Capture.** As illustrated in Exhibit 11f, the volume of wild salmon harvested from waters adjacent to this Region has increased significantly since 1997, especially for chum and pink salmon.

Exhibit 11f — Trends in the commercial salmon harvest from adjacent waters 1997 and 2005



- **Processing**. As illustrated in Exhibit 11g, the total volume of wild salmon processed in the Region decreased from 898 tonnes in 1997 to 368 tonnes in 2005, and the wholesale value of processed wild salmon in this Region decreased 65% from 1997 to 2005.

Exhibit 11g — Trends in wild salmon processing 1997 and 2005[1]

Wild salmon processed	1997	2005	% Change
Quantity (tonnes)	898	368	-59%
Wholesale Value ('000)	$3,482	$1,210	-65%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

11.7.3 Salmon sport fishing

While historical salmon sport fishing angler effort (boat trip) data are not available for the North and Central Coast, the total salmon caught nearly doubled between 1992-95 and 2002-05 (see Exhibit 5d), suggesting similar levels of increase in salmon sport fishing activity.

12. Region #5: North Coast

12.1 Area and population

This Region encompasses the Skeena River watershed and the Queen Charlotte Islands along the northern-most coastline of BC. A map of this Regional District is presented in Exhibit 12a.

Exhibit 12a — Region #1 Regional District Maps

Source: BC Stats

2005 Population

Skeena-Queen Charlotte	22,464
Prince Rupert	14,974
Rest of Regional District	7,490
% BC	0.5

12.2 Economic base

The income dependency profile for Skeena-Queen Charlottes is summarized in Exhibit 12b. The public sector and forest industries represent over half of income dependency in the Region. Fishing and trapping represents a relatively high percentage of income dependency compared to the other study Regions at 9%.

Exhibit 12b
Region #5 income dependencies (2000)

Skeena-Queen Charlotte	
Public Sector	30%
Forestry	25%
Fishing and Trapping	**9%**
Tourism	**7%**
Agriculture	**1%**

12.3 Regional economic importance of salmon farming

There are two marine finfish farms in Region #5. Both of these sites are owned by Pan Fish Canada, and both are inactive.

12.4 Regional economic importance of the wild commercial salmon industry

12.4.1 Wild salmon harvesting

Revenues from commercial salmon fishing activities received by entities in Region #5 were estimated to be approximately $5.1 million in 2005. The harvesting industry supported approximately 36 full-time equivalent jobs[1].

12.4.2 Wild salmon processing

The volume and wholesale values of wild salmon processed in this region in 2005 are summarized in Exhibit 12d.

Exhibit 12d — Region #5 wholesale value of salmon processed[1]

	Tonnes	Wholesale Value ($'000)	Number of Companies
Wild salmon processed	7,548	$38,961	12

1 Data prepared for MMK Consulting by BCMoE, Oceans and Marine Fisheries.

Fish processing is an important industry in this Region. In 2005, 12 companies reported processing 7,548 tonnes of wild salmon with an estimated wholesale value of $39 million. Processed volumes in this Region rank second behind the Fraser River & GVRD (Region #2), which reported processing 33,000 tonnes.

[1] Details calculation in Appendix C.

Exhibit 12e lists the major employers in the region involved in salmon processing.

Exhibit 12e — Major employers in salmon processing in Region #5

Company	Salmon Processed		Plant location	Employment[1]
	wild	farmed		
Canadian Fishing Company	yes	no	Prince Rupert	500
Andersen Foods International	yes	no	Prince Rupert	100+
Prince Rupert Custom Processors	yes	no	Prince Rupert	100+
Great Glacier Salmon Ltd.	yes	no	Prince Rupert	21-50
Albion Fisheries Ltd.	yes	yes	Queen Charlotte	10

1Includes seasonal employment and other seafood processing.

Employment in wild salmon processing is estimated at 222 full-time equivalent jobs[1].

12.5 Regional importance of salmon sport fishing

Region #5 encompasses a significant number of sport salmon fishing areas and a sophisticated network of companies focused on servicing recreational anglers. Over the past two decades, the recreational fishery of the North Coast has growth significantly, with one estimate placing the increase in fishing effort at more than 300%.[2] DFO recorded 49,051 boat trips in waters adjacent to this region in 2005.

Regional economic impacts of sport salmon fishing based activities are as follows:

- **Total output.** The economic benefit to this region of recreational salmon fishing-related expenditures is estimated to be $37.6 million.
- **Employment.** Employment in the salmon sport fishery is estimated at approximately 372 full-time equivalent jobs.[3]

[1] See Appendix C for detailed calculation.

[2] Kristianson, G and D. Strongitharm, "The Evolution of Reecreational Salmon Fisheries in British Columbia," June 2006.

[3] See Appendix D for detailed calculation.

12.6 Economic importance – Region #5

The economic analysis for this Region is summarized in Exhibit 12f.

Exhibit 12f — Summary of 2005 estimates of Regional economic importance of salmon

Industry Segment (2005)	Direct Output ($'000)	Direct Employment (FTE)
Salmon Aquaculture	0	0
• Salmon Processing (Farmed)	0	0
Wild Salmon Fishery:	5,098	36
• Salmon Processing (Wild)	38,961	222
		258
Recreational Salmon Fishing	37,575	372
Total Salmon-Based Employment		630
Experienced Labour Force (2001)		11,475
% of Experienced Labour Force in Region #5		5.5%

For Region #5, the wild commercial salmon industry (including processing) has the greatest output value, while the salmon sport fishing industry is the greatest contributor to regional employment[1].

[1] The Region #5 results illustrated in Exhibit 12f indicate a total salmon-based economic value (direct output) of approximately $61 million. This figure is lower than that of a March 2006 IBM study, which estimated the total value of the wild salmon economy of the Skeena River Watershed as approximately $121 million. The difference is due mainly to the broader approach taken by the IBM study in ascribing economic impacts:

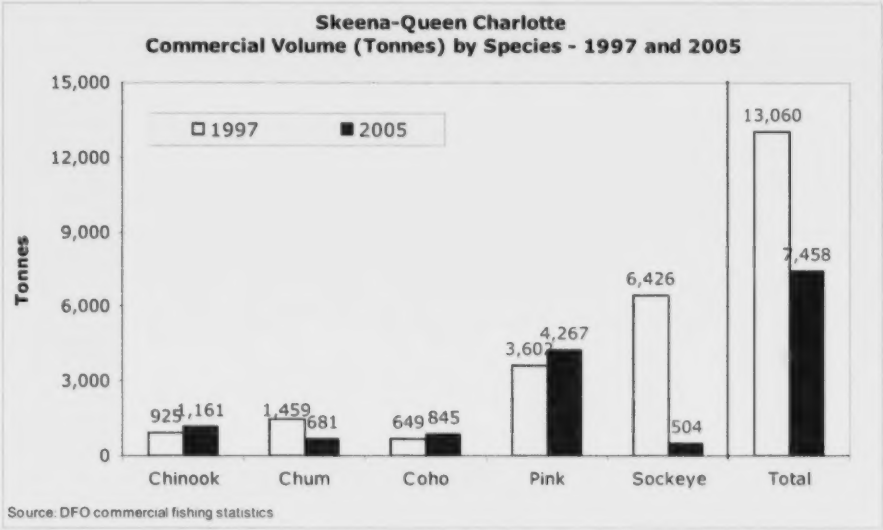
- Non-angling tourism revenues are not included in this study's primary analysis (although they are discussed in Chapter 14). The IBM study estimates these impacts as having a value of $7.6 million.
- Certain Alaska-related salmon operations (Skeena salmon landed and/or processed in Alaska, etc.) are not included in the scope of this study, since the economic impacts occur outside of BC. The IBM study estimates these as having a value of $27.8 million.
- Certain value-added operations beyond the wholesale stage (retail sales, etc.) are outside the scope of this study, but are estimated by IBM as having a value of $8.7 million.
- First Nations impacts (non-regular commercial, food fishery), not included in this study's scope, are estimated by IBM as having a value of $4.2 million.

12.7 Industry trends since 1997

12.7.1 Wild commercial salmon

As Exhibit 12h illustrates, the salmon catch from waters adjacent to this Region has declined since 1997, due mainly to decreased sockeye volumes.

Exhibit 12h — Trends in the commercial salmon harvest from adjacent waters 1997 and 2005



On the other hand, the volume of wild salmon processed in this Region was higher in 2005 than1997. (These figures include canning and other processing of Alaska salmon, and may vary significantly from year to year.) Seven companies reported processing 6,191 tonnes of wild salmon in 1997, while 12 companies reported processing 7,548 tonnes in 2005. Volume and wholesale value data for this sector are summarized in Exhibit 12g.

Exhibit 12g — Trends in wild salmon processing 1997 and 2005[1]

Wild salmon processed	1997	2005	% Change
Quantity (tonnes)	6,191	7,548	22%
Wholesale Value ('000)	$48,783	$38,961	-20%

1 Data prepared for MMK Consulting BCMoE, Oceans and Marine Fisheries.

Exhibit 12g also illustrates that, while volumes have increased, wholesale values have decreased, reflecting lower salmon market prices in 2005 than 1997.

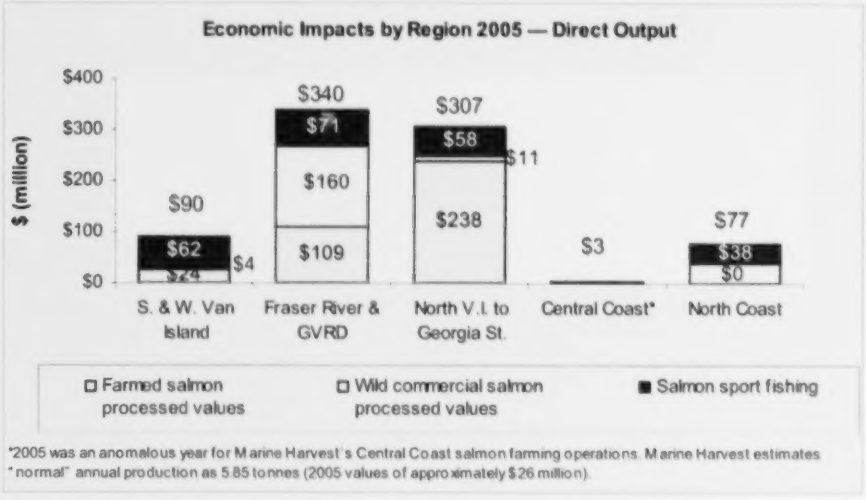
12.7.2 Salmon sport fishing

While historical data regarding salmon sport fishing effort for this Region are not available, industry studies (as discussed earlier in this chapter) indicate that activity in this sector has increased significantly in recent years, and DFO has recorded a nearly 100% increase in salmon caught in the North and Central Coast between 1992-95 and 2002-05.

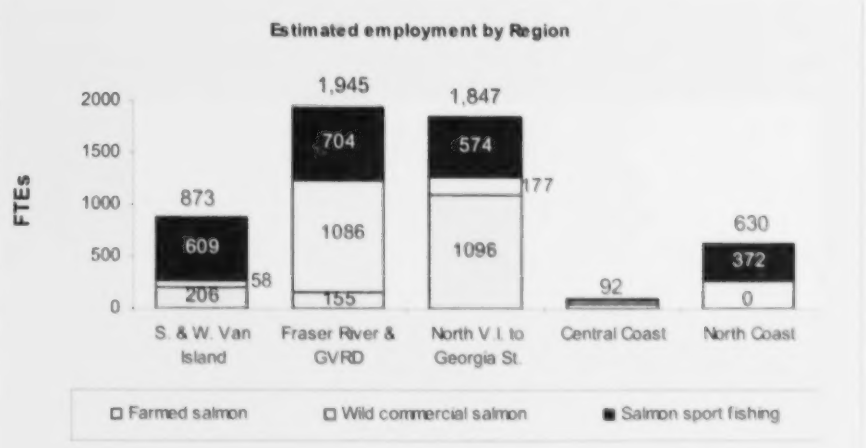
13. Summary Comparisons of Regions

Exhibit 13a illustrates the results of the regional analyses presented in Chapters 8-12.

Exhibit 13a — Regional results for total output and total employment



*2005 was an anomalous year for Marine Harvest's Central Coast salmon farming operations. Marine Harvest estimates "normal" annual production as 5.85 tonnes (2005 values of approximately $26 million).



Salmon farming is heavily concentrated in Region 3. Significant salmon farming aquaculture operations also exist in Region 1, and significant processing operations exist in Region 2.

Wild commercial salmon operations are most significant in Regions 2, 3 and 5. Processing operations are located primarily in Regions 2 and 5.

Sport salmon fishing represents a relatively significant share of the salmon-based economy in all regions. While activity levels have declined in the Strait of Georgia in recent years, sport fishing still represents a significant share of salmon-related economic activity in Regions 1 and 2.

Exhibit 13b presents overall results in tabular form.

Exhibit 13b — Economic impacts by Region[1]

	Regions					
	#1 South and West V.I	#2 Fraser River & GVRD	#3 North V.I. to Georgia St.	#4 Central Coast	#5 North Coast	Total BC
A. Salmon farming industry sector						
• Licenced farmed salmon sites	25	0	93	5	2	125
• Direct output 2005 ($000)						
- Farmgate value (before proc.)	73,285	0	244,911	0 [2]	0	318,198
% of BC total	*23%*	*0%*	*77%*	*0%*	*0%*	*100%*
- Processed values	24,260	108,713	238,114	0 [2]	0	371,089
% of BC total	*7%*	*29%*	*64%*	*0%*	*0%*	*100%*
• Employment						
- Salmon farming	174	0	651	25	0	850
% of BC total	*20%*	*0%*	*77%*	*3%*	*0%*	*100%*
- Farmed salmon processing	32	155	445	18	0	650
% of BC total	*5%*	*24%*	*68%*	*3%*	*0%*	*100%*
Total employment	206	155	1,096	43	0	1,500
% of BC total	*14%*	*10%*	*73%*	*3%*	*0%*	*100%*
B. Wild salmon industry sectors						
1. Wild commercial salmon fishing						
• Direct output 2005 ($000s)						
- Landed value (before process.)	5,510	9,624	11,886	783	5,098	32,901
% of BC total	*17%*	*29%*	*36%*	*2%*	*15%*	*100%*
- Processed values	4,418	159,944	10,977	1,210	38,961	215,510
% of BC total	*2%*	*74%*	*5%*	*1%*	*18%*	*100%*
• Employment						
- Wild commercial fishing	45	93	111	15	36	300
% of BC total	*15%*	*31%*	*37%*	*5%*	*12%*	*100%*
- Wild commercial processing	13	993	66	13	222	1,307
% of BC total	*1%*	*76%*	*5%*	*1%*	*17%*	*100%*
Total employment	58	1,086	177	28	258	1,607
% of BC total	*4%*	*68%*	*11%*	*2%*	*16%*	*100%*
2. Sport salmon fishing						
• Direct output 2005 ($000)	61,549	71,231	58,091	2,075	37,575	230,521
% of BC total	*27%*	*31%*	*25%*	*1%*	*16%*	*100%*
• Employment 2005 (FTEs)	609	704	574	21	372	2,280
% of BC total	*27%*	*31%*	*25%*	*1%*	*16%*	*100%*
3. Combined wild salmon sectors						
• Combined output 2005 ($000)	65,967	231,175	69,068	3,285	76,536	446,031
% of BC total						
• Combined employment 2005 (FTEs)	667	1,790	751	49	630	3,887
% of BC total	*17%*	*46%*	*19%*	*1%*	*16%*	*100%*
C. Overall salmon industry						
• Total direct output 2005 ($000)	90,227	339,888	307,182	3,285	76,536	817,120
% of BC total	*11%*	*42%*	*38%*	*0%*	*9%*	*100%*
• Total employment 2005 (FTEs)	873	1,945	1,847	92	630	5,387
% of BC total	*16%*	*36%*	*34%*	*2%*	*12%*	*100%*
• Importance of salmon empoyment						
- Regional labour force	185,125	1,165,565	134,815	1,875	11,475	2,263,400
- Total salmon industry employment as % of Regional labour force	*0.5%*	*0.2%*	*1.4%*	*4.9%*	*5.5%*	*0.2%*

1 Inactive.

2 2005 was an anomalous year for Marine Harvest's Central Coast salmon farming operations. Marine Harvest estimates "normal" annual production as 5.85 tonnes (2005 values of approximately $26 million).

PART III

IMPACTS ON OTHER INDUSTRIES

14. Impacts on Other Industries and Sectors

This Chapter addresses two secondary components of this study:

- Impacts of the salmon farming, wild commercial and sport fishing industries on other industries in British Columbia
- Impacts of the aquaculture industry on industries that are reliant on wild salmon.

14.1 Economic impacts on other BC industries

14.1.1 Additional indirect/induced economic impacts

All of the three industry sectors have significant "spin-off" indirect (supplier) and induced (employee spending) economic impacts on the BC economy. As discussed in Chapter 7, these indirect and induced impacts typically account for an additional 69% to 88% in total economic output, beyond the direct economic output of the particular industry.

14.1.2 Market impacts of salmon farming on the wild commercial salmon industry

The emergence of the salmon farming industry, both in British Columbia and worldwide, has had a very significant effect on traditional markets for BC wild salmon:

- **Western US fresh salmon market share**. As illustrated earlier (see Exhibit 2g), BC farmed salmon has displaced BC wild salmon in much of the Western US fresh salmon market. The wild commercial salmon industry's loss of this high-value market has resulted in a greater mix of lower-value production (frozen, tinned) for the wild commercial salmon industry.
- **International markets for salmon**. As discussed previously (see Exhibit 2c), salmon prices have been trending downward over the past 10 years. Industry sources attribute much of this long-run trend to the emergence of fish farming operations around the world. In particular, the successful penetration of US and Japanese markets by frozen Chilean farmed salmon has put downward pressure on BC wild salmon prices in each of these key markets. This impact is not specifically attributable to the BC farmed salmon industry, which represents only 4% of global farmed salmon production, but rather to the worldwide growth in farmed salmon production, to the point where farmed salmon (including salmon trout) accounted for 65% of global production in 2004. As a recent major study has noted,

> *"...wild salmon prices are driven more and more by farmed salmon supply rather than by wild salmon supply because wild salmon becomesa small player in the market".*[1]

[1] Knapp et al. The Great Salmon Run: Competition Between Wild and Farmed Salmon, 2007, p. xxiii.

14.2 Impacts of the aquaculture industry on BC industries reliant on wild salmon

14.2.1 Other (non-fishing) salmon-related tourism industries

In addition to the wild commercial and salmon sport fishing industries, a number of other industry sectors, particularly tourist-related, are at least partly reliant on the health of wild salmon stocks. Many studies of the economic impacts of specific industry sectors have been undertaken in recent years.[1] Among these, the two previous studies that are most relevant to this study are:

- Economic Value of the Commercial Nature-Based Tourism Industry in British Columbia ("Economic Value" study). This study was performed by Pacific Analytics and Tourism British Columbia, in cooperation with the Wilderness Tourism Association, in September 2004.
- Characteristics of the Commercial Nature-Based Tourism Industry in British Columbia ("Characteristics" study). This study was performed by Tourism British Columbia, in cooperation with the Wilderness Tourism Association, in January 2005.

Based on an analysis of the financial records of a sample of nature-based tourism industries in BC, the Economic Value study estimated the direct economic impact of this sector in 2001 as providing $854 million in total output, $429 million in GDP, and 13,900 person-years of direct employment. When indirect and induced impacts are included, these estimates increase to $1.55 billion in total output and $783 million in GDP, providing 20,800 person-years of employment.

The Characteristics Study also developed estimates of the relative revenues of 20 commercial nature-based-tourism sub-sectors. These percentages are provided in Exhibit 14a, and are also applied to the $854 million in total direct output estimated by the Economic Value study.

As illustrated in Exhibit 14a, saltwater fishing accounted for approximately 18% ($154 million) of the economic output of BC's nature-based tourism industries in 2001. In addition, Exhibit 14a also identifies several other significant tourism industry segments (freshwater fishing, marine wildlife viewing, ocean kayaking, etc.) that have an economic interest in wild salmon stocks. In 2001 these accounted for a further $214 million (25%) of total output.

Representatives of the Wilderness Tourism Association have indicated that non-fishing salmon-related industries have grown significantly in recent years, and that a current industry survey is in process to update the 2001 figures.

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[1] Examples include (1) "The Guide Outfitting Industry in BC: An Economic Analysis of 2002, and (2) Economic Impact Analysis of Outdoor Recreation on British Columbia's Central Coast, North Coast and Queen Charlotte Islands/Haida Gwai.

Exhibit 14a -- Relative size of saltwater tourist fishing to other commercial nature-based tourism (2001)

	Number of Businesses[1]	Percentage of Revenue[2]	Share of Total Revenue ($ million)[3]
Saltwater Fishing			
■ Lodges	132	17%	$145
■ No Lodge	71	1%	$9
	203	18%	$154
Other Salmon- Related[4]			
■ Ocean Kayaking	137	3%	$26
■ Boat Charters	298	9%	$77
■ Scuba Diving	54	1%	$9
■ Marine Wildlife Viewing	41	1%	$9
■ Sail Cruising	85	6%	$51
■ Pocket Cruising	10	<1%	
■ Freshwater Fishing - Lodges	145	4%	$34
■ Freshwater Fishing - No Lodge	116	1%	$9
	886	25%	$214
Other Commercial Nature-Based Tourism[4]			
■ Comprehensive Lodge	52	9%	$77
■ Standard Lodge	43	2%	$17
■ Guest Ranch	71	4%	$34
■ Guide Outfitters	236	16%	$137
■ River Rafting	79	2%	$17
■ Freshwater Kayaking/Canoeing	40	<1%	
■ Land-Based Summer	407	9%	$77
■ Mountain Biking	44	<1%	
■ Land-Based Winter	100	8%	$68
■ Heli-Skiing	32	7%	$60
	1104	57%	$487
Total	2193	100%	$854

1 "Characteristics" study, page 11.
2 "Characteristics" study, page 13.
3 Combining "Characteristics" study results (page 11) with the "Economic Values" total revenue estimate of $854 million.
4 Classification of "salmon-related" and "other commercial" by MMK Consulting.

14.2.2 Views of salmon-related tourism industry members

In interviews performed in conjunction with this study, several operators of salmon-reliant and salmon-based industries have expressed concern about the environmental impact of salmon farming on wild salmon stocks in British Columbia, and thus the potential impact on their businesses. None of the individuals interviewed indicate that they have experienced any significant loss of business to date, but all indicate that it is a significant concern for the future.

A number of tourism operators and associations (for example, the BC Wilderness Tourism Association, www.wilderness-tourism.bc.ca) are formally opposed to any further expansion of the BC salmon farming industry, because of concerns about the potential impact of this industry on wild salmon.

PART IV

ECONOMIC PROSPECTS

15. Economic Prospects

An assessment of the economic prospects for each of the salmon industry sectors is illustrated in Exhibit 15a, and is discussed in the balance of this chapter.

Exhibit 15a — Economic prospects

	Salmon farming	Wild commercial salmon	Salmon sport fishing
Barriers/ threats to growth	• Environmental impact concerns • New site availability • First Nations issues • Regulations on current operations • International ownership and competition for new investment • Market competition and price fluctuations • Changing consumer demographics and product preferences	• Precautionary resource management • Reduced access to chinook/coho • Environmental risks to wild stocks • Market competition from farmed salmon • Capture overcapacity and unprofitability • Consistency of product, price levels • Competition from Alaska canneries • Competition for Alaska salmon from Chinese processors	• Environmental threats to wild stocks • Poor fishing in Georgia Strait • Future quality of fishing in other areas
Opportunities for growth	• Strong prices in US fresh market • Improving production yields • Partnering with wild salmon distributors	• Increased harvest levels • Further industry restructuring • Improved product quality and consistency • Premium-price niche markets	• Good salmon fishing outside Georgia Strait • Growth in other salmon-related tourism • Possible partial recovery in Georgia Strait
Assessment of Prospects	• Very strong in short to medium term • Long term depends on ability to expand production	• Weak in the short to medium term • Long term depends on industry restructuring	• Poor in Georgia Strait, strong elsewhere

15.1 Economic prospects — BC salmon farming industry

15.1.1 Current economic situation

The Western US fresh salmon market accounts for 85% of BC farmed salmon sales, and this market is the primary driver of demand for BC farmed salmon. As detailed in Chapter 3, BC production first peaked in 2002, decreased in 2003 and 2004 during a period of weaker prices, and has since rebounded in 2005 and 2006 as prices have strengthened and volumes have increased. The consensus within the industry is that the US market will continue to be strong into the foreseeable future[1].

The industry is forecasting much of the market competition for BC farmed salmon over the next few years to come from Chilean farmed salmon. Chile has a significant production cost advantage over BC, and has attracted significant new capital investment to increase production in recent years. At the same time, BC salmon farmers have a significant competitive advantage over Chilean producers in serving Western US markets, in that they are able to deliver fresh salmon by truck, without needing to freeze or air-freight the product[2].

15.1.2 Barriers and threats to industry growth

Despite its very significant growth over the past two decades, future growth of the industry is facing several barriers including:

- **Environmental impact concerns** about the potential long-term environmental impacts of salmon farming on wild salmon stocks. Much has been written on this issue, and some individuals and groups are strongly opposed to further expansion of the industry as it is currently operating.

- **New site availability**. While the industry has doubled its production over the past decade without significant expanding the number of licensed sites, it is not clear that similar increases can be accomplished in future without expanding the number of sites. The industry has estimated its maximum production capacity, based on the number of licensed sites in early 2007, as approximately 90,000 tonnes annually.

  Several applications to establish new sites in recent years have experienced significant delays, despite considerable investments by applicants in the approval process. Some applications have been in process for up to four years.

- **First Nations issues**. Many of the existing sites and proposed new ones are potentially impacted by First Nations land claims, and/or are located near to First Nations communities.

- **Operating regulations**. BC salmon farming industry sources have indicated that the current levels of regulation in BC tend to be much more stringent than competing salmon farming jurisdictions.

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1 Source: Industry interviews, plus presentation by Price Waterhouse Coopers, Salmon Farming Overview: 2005, September 13, 2006, p 19.

2 Washington State also provides some competition, although none of the US states to the south offer nearly as many favorable salmon farming areas as BC. Alaska is currently pursuing an "ocean ranching" strategy, releasing pen-reared fish into the ocean for harvesting when they return to the area, which if successful could be a source of future market competition.

- **International ownership and competition for new investment**. Merger activities in recent years (see Chapter 3) have placed most of the BC industry's production under the ownership of international firms with worldwide salmon farming operations. This shift in ownership means that BC sites will have to compete with other jurisdictions for investment in salmon farming operations.

- **International market competition and price movements**. The price of BC farmed salmon dropped significantly in 2001 and 2002, partly as a result of the increasing supply of BC and Chilean farmed salmon to US markets. While prices have recovered over the past few years and US demand is expected to be strong in the next few years, industry sources are also expecting the international competition from Chile and possibly other jurisdictions to increase, with improvements in technology and product quality in freezing farmed salmon for international distribution.

15.1.3 Opportunities for industry growth

On the other hand, farmed salmon has strong potential for market growth in the short to medium term:

- **Current strong markets and prices**. Product acceptance, market demand, and price levels are all good in the primary US market, and the industry is expecting the current strong markets to continue into the short to medium term. Industry sources indicate that, in early 2007, suppliers are struggling to respond to sales opportunities because of lack of supply.

- **Improving production yields**. Between 1997 and 2006 the industry increased its total production, from 36,600 tonnes to 83,000 tonnes (preliminary), despite the lack of significant increases in the farm sites. Production yields have improved with experience.

- **Improved access to capital**. Industry consolidation and international ownership improves the industry's access to capital resources for new investment.

- **Partnering with major seafood salmon processors/distributors**. For example, Trident Seafoods (a US-based seafood distributor) has recently announced a distribution partnership with Marine Harvest, Canada, to distribute BC farmed salmon along with its traditional wild seafood products.

15.1.4 Assessment — Salmon farming

Based on these considerations, our assessment is that the short- to medium-term economic prospects for the BC salmon farming industry are very strong. Prices were increasing throughout most of 2006, and were in the range of US $4.00 per pound in early 2007.

Preliminary figures for 2006 indicate a total production of approximately 83,000 tonnes, a significant increase over 2005's 70,600 tonnes. The BC Salmon Farmers' Association estimates maximum industry production as about 90,000 tonnes, based on existing numbers of licensed sites.

In the longer run, the economic potential of the industry is linked to how many additional sites will be authorized. If additional sites are licensed, then the growth of the industry will depend primarily on North American demand for fresh salmon in the Western United States, countered by increasing competition from overseas frozen farmed salmon (mainly from Chile) and also possibly from competing fresh salmon producers (farming and/or sea ranching) in Washington State and Alaska.

15.2 Prospects for the wild commercial salmon industry

15.2.1 Current economic situation

As discussed in Chapter 4 and illustrated in Exhibit 4c, the size of the wild salmon harvest has decreased over the past 20 years, from more than 100,000 tonnes in 1986 to less than 40,000 tonnes in 2004 and 2005. This decrease is attributable to a combination of:

- More restrictive DFO resource management policies, with increasing focus on limiting openings to protect the weaker salmon stocks.
- The wild salmon sector's loss to the sport fishing sector of priority access to chinook and coho salmon, beginning in 1999.

Average landed prices for wild salmon have also decreased in recent years. This reduction in average prices reflects:

- Loss of priority access to higher-value chinook and coho, resulting in a higher proportion of the species mix being the lower-value pink and chum salmon.
- Market competition from the BC and Chilean salmon farming industries, whose production of farmed salmon has put downward pressure on wild salmon prices in North America and Japan.

The combination of declining harvest volumes and declining prices has resulted in an industry whose revenues are only a fraction of their former levels. License buy-back programs implemented in the 1990s, coupled with "license stacking" to enable salmon license-holders to fish multiple species, have only partly addressed this problem, and the industry is not profitable as currently structured.

15.2.2 Barriers and threats to industry growth

The barriers to growth in the wild salmon industry have been well articulated in a number of industry studies.[1] They include:

- **Precautionary resource management policies,** as practiced by the federal Department of Fisheries and Oceans (DFO) since the late 1990s, which continue to strictly limit the industry's access to wild stocks.
- **Environmental threats to wild stocks**. The size of the annual runs for each wild salmon species has varied greatly from year to year ever since records have been kept. Some of the reasons put forward to explain this variation include:
  - Annual differences arising from the four-year cycle of salmon from being spawned to returning to spawn, and the belief that some cycles are stronger than others.
  - Changes in the ocean's temperature, salinity content, and abundance of nutrients, because of natural forces and/or the impact of human industrial activity.
  - Degradation of British Columbia's spawning beds, and river access to spawning beds, resulting from land-based human activity (forestry, community developments, etc.).
  - Possible impacts of salmon farming on wild salmon stocks. (This is a topic on which this report expresses no opinion.)
- **Increased industry reliance on sockeye/chum/pink salmon**. Loss of priority access to chinook and coho to the sport fishing sector has made the wild salmon industry more reliant on higher-value sockeye and lower-value chum and pink salmon.
- **Market competition from the farmed salmon industry**, from both domestic producers (fresh salmon) and Chilean producers (frozen salmon).
- **Market demand softness in Japan**, coupled with increased competition from Chilean coho in that market, leading to lower volumes into Japan in recent years.
- **Continued industry overcapacity and lack of profitability**. Despite the buy-back/license stacking programs of the 1990s, continued overcapacity and lack of profitability has limited the industry's ability to upgrade its harvesting, processing, and distribution systems.
- **Fragmented industry structure,** making it difficult to reach consensus on initiatives to rationalize and revitalize the industry.
- **Market competition from Alaskan canners**, especially in the production of quarter-pound and half-pound cans.
- **Market competition from Chinese processors.** Trade statistics indicate that China has begun to import Alaska salmon for processing and re-exporting, in competition with Alaska and BC canners.

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[1] For example, see "Fraser River Sockeye Salmon Benchmark Study", Stuart Nelson, 2006.

15.2.3 Opportunities for industry growth

Despite these barriers and threats, the industry also has some significant opportunities for economic growth:

- **Development of premium-price niche markets**. Many salmon consumers have a strong preference for wild salmon over farmed salmon, and this preference presents opportunities to market wild salmon to niche markets, at premium prices. These niche market opportunities could arise in many forms, such as:
  - Differentiating the product by species and source. For example, one Alaskan group of producers has already successfully achieved specific brand image and market differentiation for its "Copper River" early-run sockeye.
  - Developing vertically integrated operations, to capture, process, distribute and retail salmon and other seafood products. For example, one Victoria-based company, Finest at Sea (www.finestatsea.com) is now retailing its own self-caught salmon (and other seafood products) through retail outlets in Victoria and Vancouver, in addition to its traditional offshore markets.
  - Broader industry initiatives to "brand" wild salmon as a premium product, (relative to farmed salmon), including introduction of industry-wide product quality controls.
- **Increases in allowable harvest levels.** Under DFO's precautionary stock management policies and practices of the past decade, allowable harvest levels have been heavily reduced. Some industry experts believe that there is now room for selective increases in allowable harvest levels, while continuing to protect the resource base.
- **Improved processing methods and product quality**. Improving technology for processing wild salmon (e.g. flash-freezing at sea) enables wild salmon to be appropriately prepared for their various markets. Improved wild salmon product quality control is a key component of establishing wild salmon as a premium product.
- **Further industry rationalization and restructuring**. Many previous attempts have been made to address industry structural issues. Despite some partial successes (e.g. license buy-back and stacking programs of the 1990s), the industry's economic health has continued to suffer with declining catch volumes and values. A number of structural initiatives have been proposed to deal with the poor economic health of the industry (further fleet rationalization, individual quotas on catches, etc.), although the current fragmentation of the industry is seen as a significant impediment to its restructuring[1].

15.2.4 Assessment — Wild commercial salmon

The outlook for the future economic performance of the wild commercial salmon industry is uncertain. In the short to medium term, the outlook is weak, as market competition from farmed salmon (both domestic and international) is expected to limit the potential for prices to improve. Some increases in catch levels would allow the industry to regain some of its former volumes and value of production.

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[1] An industry-driven association of license-holders, the Commercial Salmon Advisory Board, was formed in 2006 to try to develop consensus within the industry on the many of these issues.

In the longer run, the industry needs to be significantly restructured, including fulfillment of some of the opportunities identified, to become economically viable.

15.3 Economic prospects – Salmon sport fishing industry

15.3.1 Current economic situation

As detailed in Chapter 5, the current economic situation for the salmon sport fishing industry varies by region:

- In Georgia Strait, the dramatic decline in chinook and coho catch levels has led to a 68% decline in fishing activity between 1992-95 and 2002-05.
- Outside Georgia Strait, fishing activity and total catches has increased significantly in other areas. These areas offer significantly superior salmon catching opportunities to those available in Georgia Strait.

15.3.2 Barriers and threats to industry growth

The barriers and threats to the future growth of the salmon fishing industry include:

- **Environmental threats to wild stocks**. As described earlier, the strength of the wild stocks varies significantly from year to year, due to many factors—spawning cycles, natural changes in ocean conditions, land-based human activity, and marine-based human activity. This industry is reliant on the quality of salmon sport fishing opportunities, and thus is dependent on the future health of wild salmon stocks.
- **Poor fishing in Georgia Strait**. The dramatic decline in the quality of the fishing opportunity in Georgia Strait (see Exhibit 5d) over the past decade represents a significant barrier to the recovery of the industry for BC as a whole. Despite the growth in fishing activity in other regions, overall provincial activity level indicators are down because of the Georgia Strait situation.
- **Future quality of fishing opportunities in areas outside Georgia Strait**. While the quality of the salmon sport fishing opportunity in some other fishing areas (e.g. West Coast of Vancouver Island, Johnstone Strait) is much better than in Georgia Strait, DFO statistics indicate that the salmon caught per boat trip has declined over the past decade.

15.3.3 Opportunities for industry growth

The salmon sport fishing industry also has a number of potential growth opportunities:

- **Growth in activity levels outside Georgia Strait.** DFO statistics indicate that angler activity in other areas (West Coast Vancouver Island, North and Central Coast, Johnstone Strait) has grown significantly, and industry sources indicate that tourist demand for lodge-based sport fishing and related wilderness-oriented packages has been growing in recent years.
- **Continuing high quality of the fishing opportunity outside Georgia Strait.** Salmon sport fishing outside Georgia Strait continues to offer relatively good

opportunities to catch fish, with average catches (per angler boat trip) of 2.1 for Johnstone Strait and 2.2 for the West Coast of Vancouver Island in 2002-05.

- **Growth in other salmon-related tourism industries.** As described in Chapter 14, there are a number of other tourism industries (marine wildlife viewing, bear-watching, etc.) that have an economic interest in the health of BC's wild salmon stocks.

- **Possible recovery of recreational fishing in Georgia Strait.** If the quality of the salmon fishing opportunity in Georgia Strait can recover even partially, this region may be able to recapture some of its previous sport fishing activity level.

15.3.4 Assessment — Salmon sport fishing

The outlook for the salmon sport fishing industry varies by region and by subsector. Barring a recovery of chinook/coho stocks in Georgia Strait, the growth potential for the large traditional sport fishing industry in the area will continue to be poor. On the other hand, the outlook for growth of the salmon sport industry in other parts of BC is strong, so long as the quality of the fishing opportunity can be maintained.

APPENDICES

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A. Basis for Estimates of BC-Wide Economic Impacts

A.1 Overview

The estimates of direct economic impacts contained in this report result from a combination of (1) direct industry research and interviews and (2) the review and assessment of information from more than 30 relevant studies and numerous web sources. In developing estimates of overall BC-wide economic activity, we have made particular use of eight different sources of information and data, as identified in the footnotes to Exhibit A(i).

Exhibit A(i) — Key sources used in estimating BC-wide impacts

	Total Output	GDP, Govt. Revenues	Employment
Salmon farming	■ MoE[1]	■ BCIOM[2]	■ BCIOM[2] ■ Panfish & Cermaq annual reports ■ Industry-provided information[3] ■ Actual operation ■ Gislason study[4]
Wild commercial	■ MoE[1]	■ BCIOM[2]	■ BCIOM[2] ■ Gislason Study[4]
Salmon sport fishing	■ BC Stats[5] ■ DFO Survey[6]	■ "Economic Values" study[7] ■ "Characteristics" study[8]	■ Gislason Study[4] ■ "Economic Values" study[7] ■ "Characteristics" sutdy[8]

1 Ministry of Environment, Oceans & Marine Fisheries Branch, "Seafood Year in Review, 2005", plus special data runs performed for this study.
2 BC Input-Output Model.
3 BC Salmon Farmers Association.
4 GS Gislason et al "British Columbia Seafood Sector and Tidal Water Recreational Fishing: A Strengths, Weaknesses, Opportunities and Threats Assessment", February 2004.
5 BC Stats "BC Fisheries & Aquaculture Sector, 2002 Edition", September 2002.
6 Fisheries & Oceans Canada "2000 Survey of Recreational Fishing in Canada".
7 Tourism BC "Economic Value of the Commercial Nature-Based Tourism Industry in British Columbia", September 2004.
8 Tourism BC "Characteristics of the Commercial Nature-Based Tourism Industry in British Columbia", January 2005.

Other information sources have also been used in assigning economic impacts on a regional basis, as discussed in Appendices B (salmon farming and processing), Appendix C (commercial wild salmon farming and processing), and Appendix D (sport salmon fishing).

A.1.1 Salmon farming/wild commercial estimates

For the salmon farming and wild commercial sectors, we have estimated the "dollar" impacts of (output, GDP, government revenues) using information developed by the BC Ministry of Environment and by BC Stats (operator of the BC Input-Output Model).

Employment estimates have been developed as discussed in sections A.2 (salmon farming) and A.3 (wild commercial salmon).

A.1.2 Salmon sport fishing estimates

For the salmon sport fishing industry, total output has been estimated based on the BC Stats 2002 report estimate of $341 million for all salt-water sport fishing, adjusted to reflect (1) Fisheries and Ocean's estimates of the share of sport fishing time spent fishing for salmon (63.5%), and (2) general CPI inflation of 6.7% between 2001 and 2005, resulting in an estimate of $231 million. GDP and government revenues have been estimated using multipliers derived from the "Economic Values" study of commercial nature-based tourism.

Employment estimates have been developed as described in Section A.4.

A.2 BC-wide employment — Salmon farming and processing

A.2.1 BCIOM estimates

The BC Input-Output Model estimates that the salmon farming industry generated a total of 2,945 FTE's in direct, indirect and induced employment in 2005.

The BCIOM figures include an estimated 3.104 person-years of direct employment per million dollars in processed farmed salmon. Based on the industry's total output of $371 million in 2005, output direct employment is estimated by BCIOM as 1152 person-years in 2005, indirect (supplier) employment is estimated as 1,380, and induced employment is estimated as 413.

Including indirect and induced impacts, the estimated 2,945 total employment represents a 155% increase over the direct employment estimate. This "multiplier" is relatively large in relation to the estimated employment impacts in most other industries. (See Exhibit 7e.)

Based on discussions with BCIOM operators, we understand that one of the likely causes of this apparent anomaly is that the reporting companies in this industry may reflect a mixture of farms, processing plants, and integrated operations. Where grow-out and processing operations are integrated and are undertaken directly by the same firms, the reported direct employment estimates will include both operations. However, where processing is separately contracted as a service by the growout operation, growout operations may be reported as direct employment with the processing operations considered as indirect (supplier) employment. This feature of the reporting methodology helps to explain the BCIOM's relatively high employment multiplier for this industry.

Given this study's approach of treating both growout and processing operations as direct employment, we have adjusted the BCIOM estimates to treat all of the farming and processing employment as direct employment, while remaining

consistent with the overall BCIOM estimates of total direct, indirect and induced employment.

A.2.2 Direct industry sources

In adjusting the BCIOM estimates, we have considered four "direct estimate" sources of information:

- **Industry information** — Our analysis of industry-provided information (by BCSFA) indicates direct employment of 850 growout and 650 processing, for total direct industry employment of 1,500 in 2005.
- **Pubic company annual reports** — Our analysis of information provided in annual reports of PanFish (Marine Harvest) and Cermaq (Mainstream) results in total industry direct employment estimates in the range of 967 to 1,145 in 2005/2006.
- **Actual operations** — Our analysis of detailed information regarding actual employment at a multi-site facility results in direct employment estimates in the range of 1,094 to 1,500 in 2006/2007.
- **Previous study** — A previous more broadly-based industry study (Gislason 2004) estimated FTE employment as 1,410 for all finfish hatchery/growout operations (p. 116), and 1,635 for all aquaculture, including shellfish processing (p. 156).

On balance, we have estimated direct employment as 850 growout and 650 processing FTEs in 2005.

A.2.3 Summary — Salmon farming employment estimates

Based on the preceding analysis, the 2005 salmon farming employment estimates (direct, indirect, and induced) used in this report are based on a combination of BCIOM and industry information:

- Total employment of 2,945 FTE's (as per BCIOM), consisting of:
  - 850 salmon farming FTEs, plus 650 processing FTEs, for total direct employment of 1500 (up by 348 from the BCIOM-based estimate).
  - Indirect employment of 1032 (BCIOM estimate of 1,380, less 348 positions reclassified as direct farming/processing employment).
  - Induced employment of 413 FTE's (as per BCIOM).
- A resulting employment multiplier calculated as 96%.

A.3 BC-wide employment — Wild commercial salmon

A.3.1 Wild salmon capture

Estimation of the "full time equivalent" ("FTE") employment in this industry is complicated by the part-time opportunistic nature of salmon fishing, with salmon fishers also reliant on other sources of income (fishing for other species, off-season work, etc.). Thus, the estimation of salmon fishing employment requires an

assignment of work effort between salmon fishing and other fishing/non-fishing activities.

Two major sources have been used in estimating total employment:

- **BCIOM Multiplier**. The BCIOM multiplier (employment per dollar of total output) for fishing, hunting and trapping is 4.12 person-years per million dollars of total output. (This value is higher than that for salmon farming, but lower than that for seafood product processing and salmon sport fishing.) Applied to the 2005 landed value of $33 million, this approach would result in estimated direct employment of 136 FTEs.
- **Gislason study.** Employment in the BC wild salmon harvesting industry in 2002 has been previously estimated (Gislason, 2004) as 950 person-years. This estimate is based on 1700 vessels, times 2.1 crew per vessel, or 3570 seasonal jobs. These seasonal jobs were translated into 950 person-years by assuming eight weeks of salmon-fishing-related work (including preparation time) for each individual, using 30 weeks work as representative of a full year. (Use of different assumptions, such as a 48-week work year and a working period assigned to salmon of less than eight weeks, would reduce the Gislason estimate significantly.) We understand that the fleet size has been stagnant (flat to declining) since the Gislason's study completion in 2004.

The difference between the 950 person-years from the Gislason study and the 136 person-years in the BCIOM estimates illustrates the extent to which the harvesting capacity of the BC commercial salmon fishing industry is greater than the value of the industry's full-time employment. As discussed in the main report, the industry has much more capacity than is required, given the current precautionary resource management policies. Thus the level of potentially gainful employment is significantly lower than the industry's current capacity.

Ultimately, the estimation of FTE employment is a subjective one. For this analysis, we have used an estimate of 300 FTEs as a representative indicator of the level of employment generated by the salmon capture industry in 2005. This estimate is equivalent to taking the Gislason estimate of 3570 potential seasonal jobs, and assigning four weeks of a 48-week FTE year to activities related to salmon fishing.

A.3.2 Wild salmon processing

Processing accounts for most of the total output and added-value associated with the wild salmon industry. In estimating employment impacts, we have used the BCIOM employment values for seafood processing and packaging—6.063 person-years per million dollars of wholesale value—as the basis for estimating employment impacts of this industry. This relationship results in estimated employment of 1,307 FTEs.

A.3.3 Summary — Wild commercial salmon employment

These adjustments result in the following direct salmon fishing employment estimates:

- Total (direct, indirect, and induced) employment of 2329 FTE's (164 higher than BCIOM), consisting of:
  - 300 fishing FTEs (164 higher than BCIOM), plus 1307 processing FTEs (as per BCIOM), for total direct employment of 1607.

- Indirect employment of 465 (as per BCIOM).
- Induced employment of 257 FTEs (as per BCIOM).

A.4 BC-wide employment — Salmon sport fishing

The salmon sport fishing sector comprises a range of very different business operations, ranging from dedicated high-end fishing lodges catering primarily to out-of-Province tourists, through to small businesses providing salmon fishing gear, equipment and services primarily to BC local residents. Given the disparity in the types of business operations, BCIOM administrators do not recommend using a standard value to relate industry output to FTEs of employment generated.

For this study, two key sources have been assessed in estimating the direct employment attributable to salmon sport fishing:

- **Gislason study estimate.** The 2004 Gislason BC Seafood and Recreational Fishing study estimated that the sport fishing industry in BC accounted for 7,240 jobs and 3,590 person-years of employment, reflecting this industry's seasonality. (The 3,590 person-years of employment consisted of 820 lodge-based, 300 charter-based, and 2,470 other, with total wages and benefits of $125 million.) Applying the DFO angler survey result (2000 survey) that approximately 63.5% of angler effort is spent fishing for salmon, the resulting estimate of FTE employment attributable to salmon fishing would be 2,280.

- **"Economic Value" and "Characteristics" reports.** As discussed in Chapter 14, two related "Economic Value" and "Characteristics" studies of nature-based tourism industries were performed in 2004/05. In these studies, saltwater fishing (mostly lodge-based) was estimated to have accounted in 2001 for 18% of the revenues (p. 13, Characteristics study) for a group of service-based industries generating total employment of 13,927.5 person-years (Economic Value study, page 9). Assuming that industry employment is generally proportional to revenues, direct saltwater fishing industry employment is in the order of 2500 FTEs.

  Applying the DFO angler survey finding that approximately 63.5% of angler effort is spent fishing for salmon, the resulting estimate of employment attributable to tourist-related saltwater salmon fishing (mostly lodge-based) is approximately 1,590 FTEs. This figure is an estimate for tourism-based salmon fishing, and does not include employment generated by local residential fishing.

On balance, we estimate employment in the salmon sport fishing industry as 2,280 FTEs.

B. Regional Assignments — Salmon Farming/Processing

B.1 Salmon farming (grow-out)

At the aquaculture (salmon farm) level, output estimates have been assigned on the basis of data of special data runs performed for this study by the BC Ministry of Environment, Oceans and Marine Fisheries, estimating regional production volumes. Farmgate values are assumed to be proportional to volumes.

Employment estimates are also proportional to volumes, with one adjustment for Region #4, where the direct estimate of FTEs is based on information received directly from the company operation in Region 4.

	No. of farm salmon sites	Farmgate volume (tonnes)[1]		Farmgate values ($000s)	Employment related to farmed salmon grow-out
Region #1	25	14,840	21.1%	$ 73,285	174
Region #2	0	-	-	-	
Region #3	94	55,500	78.9%	$244,911	651
Region #4	4[2]	-	-	-	25
Region #5	-[3]	-	-	-	-
	123	70,340		$318,196	850

1 Source: BC MoE custom data run for MMK.
2 Although Marine Harvest Canada has active sites in this Region, no production was reported for 2005.
3 Two sites in Region #5 are inactive.

Specific location of salmon aquaculture sites are illustrated in the map overleaf and may be viewed at http://www.agf.gov.bc.ca/fisheries/images/marine_fishfarms.pdf.

B.2 Salmon farming processing employment

We estimated employment in farmed salmon processing at approximately 650 FTEs (see Appendix A, A.1.2). These jobs are distributed by region consistent with the volume of farmed salmon processed, based on MoE data runs performed for this study. Employment is distributed in the same manner as for salmon farming grow-out operations..

	Farmed salmon processing volume (tonnes)[1]		Wholesale value ($000s)	Employment related to farmed salmon processing
Region #1	3,088	5.1%	$ 24,259	32
Region #2	14,693	24.4%	$108,713	155
Region #3	42,403	70.5%	$238,114	445
Region #4[2]	n/a	-		18
Region #5[3]	-	-	-	-
	60,184	100%	$371,086	650

1 Source: BC MoE custom data run for MMK.
2 Although Marine Harvest Canada has active sites in this Region, no production was reported for 2005.
3 Two sites in Region #5 are inactive.

B.3 Regional distribution of salmon aquaculture sites

This map can also be viewed electronically at
http://www.agf.gov.bc.ca/fisheries/images/marine_fishfarms.pdf

Source: http://www.agf.gov.bc.ca/fisheries/images/marine_fishfarms.pdf

C. Regional Assignments — Wild Commercial Salmon

This Appendix describes the basis for attributing total output and employment in the wild commercial salmon industry among the study regions.

C.1 Salmon harvesting employment

The total landed value of the wild salmon harvest in 2005 was $32.9 million[1]. These revenues accrued to both commercial fishers and salmon license holders. Total FTE employment in salmon harvesting in 2005 is estimated at 300 (see Appendix A).

We have assumed that these jobs are distributed across the study regions consistent with the regional labour force for fishing, hunting and trapping. Regional statistics are only available for census years, therefore, we have used the 2001 labour force distribution for this industry as the basis for assigning salmon harvesting jobs.

	Fishing/Hunting/Trapping		Assignment of Employment
	2001[1]	Distribution	
Region #1	710	15%	45
Region #2	1535	31%	93
Region #3	1755	37%	111
Region #4	235	5%	15
Region #5	555	12%	36
	4790	100%	300

1 Most of this force (Gislason estimate of 3590) consists of fishers.

C.2 Salmon harvesting revenues

C.2.1 Accruing to commercial fishers

Gislason (2004, p.83) estimated total wages (including the skipper) in 2002 as $18 million, approximately one third of 2002 landed values of $57.3 million. For 2005, landed values were $32.9 million, of which we have assumed one-third ($11 million) is wages[2] and two-thirds go to the vessel owners and license-holders. These wages are assumed among regions according to employment estimates.

[1] BC Ministry of Environment, Oceans and Marine Fisheries Division, "2005 British Columbia Seafood Industry Year in Review."

[2] As a reasonableness check, this $11 million is equal to BCIOM's estimated GDP for fish harvesting.

	Salmon Harvesting Employment	Revenues Accruing to Fishers[1]	%
Region #1	45	1,650,000	15%
Region #2	93	3,410,000	31%
Region #3	111	4,070,000	37%
Region #4	15	550,000	5%
Region #5	36	1,320,000	12%
	300	11,000,000	100%

C.2.2 Accruing to license holders

We have assumed that the balance of revenues from commercial harvesting activities, after wages earned by fishers have been assigned, are attributed to salmon license holders. Total revenue earned in the industry in 2005 was $32.9 million. Total earnings by fishers were estimated at $4,161,000. The balance of revenues, therefore, earned by license holders was approximately $28,739,000.

In 2005, there were approximately 2,220 valid commercial salmon licenses in BC. This number is relatively unchanged from 2002 (when there were 2,180 valid salmon licenses).

In estimating the regional distribution of license holders in the province, we relied on a 2002 analysis undertaken by Ecotrust Canada (see map section C.4). This analysis describes the regional distribution of non-quota commercial fishing licenses (of which approximately 60% are salmon licenses). The regions defined in their analysis are closely aligned with our study regions. By applying a few additional assumptions to their analysis, we estimate the regional distribution of salmon licenses in BC was approximately as follows:

Region	Salmon license assignment	Distribution of Salmon Licenses	Revenues Accruing to Salmon License Holders
Region #1	West Coast V.I. plus 30% of Metropolitan Region	17%	3,723,000
Region #2	70% of Metropolitan Region	29%	6,351,000
Region #3	Central Island Mainland plus North Island Mainland	36%	7,884,000
Region #4	10% of North Coast	2%	438,000
Region #5	90% of North Coast	16%	3,504,000
Total		100%	21,900,000

By assigning the balance of revenues (after harvesting-related earnings accruing to fishers) across regions according to the regional distribution of license holders, we are assuming that, on average, the revenue earned per license is relatively constant among regions. This assumption seems reasonable in light of the relatively large size of each study region.

C.2.3 Regional allocation of salmon harvesting revenues

The following table summarizes the methodology and results associated with the regional allocation of salmon harvesting industry revenues.

Region	Revenues Accruing to Fishers[1]	Revenues Accruing to Salmon License Holders	Regional Allocation of Salmon Harvesting Revenue	%
Region #1	1,650,000	3,723,000	5,593,000	17%
Region #2	3,410,000	6,351,000	9,541,000	29%
Region #3	4,070,000	7,884,000	11,844,000	36%
Region #4	550,000	438,000	658,000	2%
Region #5	1,320,000	3,504,000	5,264,000	16%
Total	11,000,000	21,900,000	32,900,000	100%

C.3 Regional wild salmon processing

C.3.1 Output estimates

The regional distribution of total output (wholesale values) of processing salmon is based on a special database run performed for this study by the BC Ministry of Environment.

	Wild salmon processing volume (tonnes)[1]		Wholesale value ($000s)	Estimated employment related to wild salmon processing
Region #1	394	1%	$4,419	13
Region #2	32,860	76%	$159,944	993
Region #3	2,229	1%	$10,977	66
Region #4	368	5%	$1,210	13
Region #5	7,548	17%	$38,961	222
Total	43,399	100%	$215,511	1,307

1 Source: BC MoE custom data run for MMK.
2 BC-wide employment estimated from BCIOM multiplier for seafood processing and packaging (6.063 FY per $million wholesale value of processed salmon). (See also Appendix A.)

C.3.2 Employment estimates

We estimated employment in wild salmon processing at 1,307 FTEs (see Appendix A, A.2.2). The regional distribution of these jobs is assumed to be proportional to volumes processed.

C.4 Regional ownership of commercial salmon harvesting licenses

Source: http://www.ecotrustcan.org/pdf/BCFishingLicenceMap.tif.

Quota licenses include halibut, sablefish, groundfish trawl, geoduck, urchins and sea cucumber fisheries. Non-quota licenses include all other major commercial fisheries except herring gillnet, herring seine, spawn-on-kelp and intertidal clams because of a lack of licensing data.

The regions defined in the Ecotrust analysis are closely aligned with those in this study. We have made a few minor adjustments to reflect this study's regions.

D. Regional Assignment — Salmon Sport Fishing

Regional assignments of salmon sport fishing are complicated by the fact that the tourist-oriented employment is seasonal, and that for many industry employees the place of employment is different from the place of permanent residence.

Any estimates of distribution of industry economic activity are based on two main sources:

- **Gislason study**. The 2004 Gislason report estimated the distribution of sport fishing employment in 2002 as illustrated in Exhibit D-1.
- **Angler activity**. Our analysis of regional angler activity, based on DFO statistics for 2005, is also distributed in Exhibit D-1. This analysis has been performed in concordance with DFO management areas illustrated in Exhibit D-2.

The two sources generate fairly similar results, with the main exception in Region #5 where the lower Gislason assignment may reflect the more seasonal nature of the industry in the North. (Gislason assigns employment based on place of permanent residence).

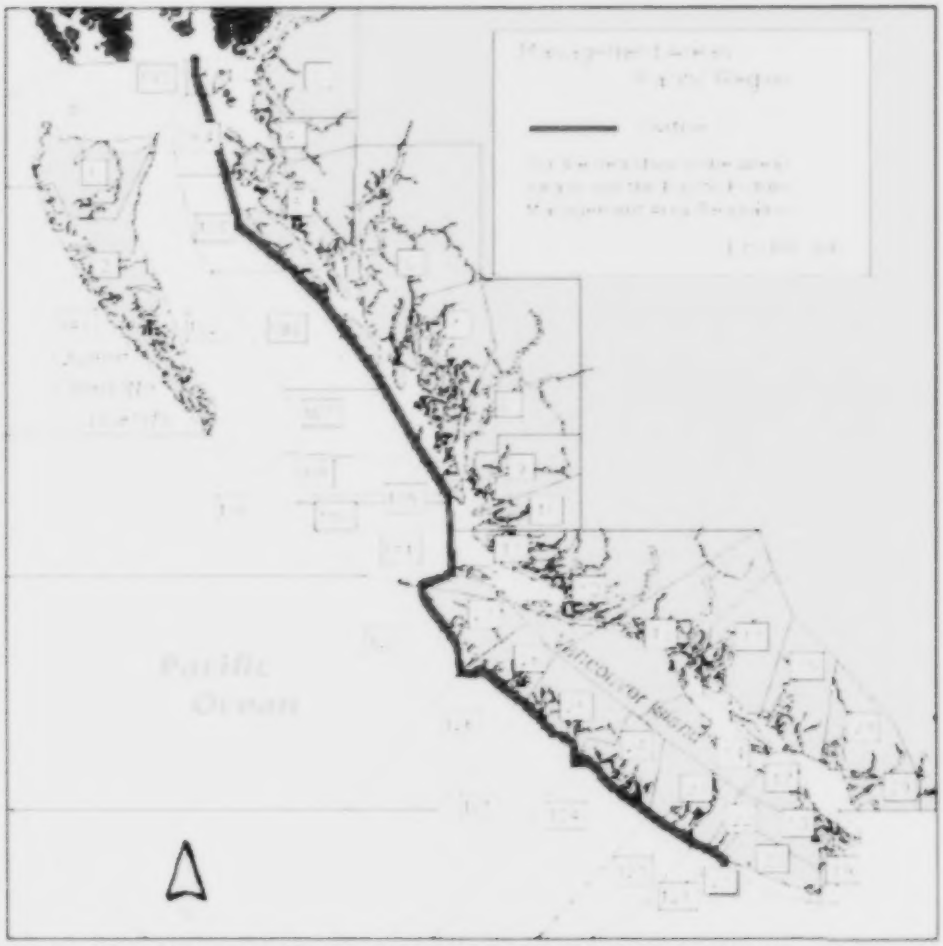
For this study, we are assigning regional economic impacts based on the location of the activity, and hence have used the angler boat-trips as the basis for distributing both employment and revenues among regions.

Exhibit D-1 — Distribution of salmon sport fishing revenue and employment

	Source #1 Gislason Report		Source #2 Angler boat trips		Estimates	
Region	Estimated total employment related to sport fishing[1]	%	Angler boat trips in 2005[2]	%	Output ($)	FTEs
Region #1	1,100	31%	80,409	26.7%	61,549	609
Region #2	1,110	31%	92,892[3]	30.9%	71,231	704
Region #3	995	28%	75,793	25.2%	58,091	574
Region #4	65	2%	2,664	0.9%	2,075	21
Region #5	320	9%	49,051	16.3%	37,575	372
Total	3,590	100%	300,810	100.0%	230,521	2,280

Totals may not add up exactly because of rounding.
1 Gislason et al 2004 study (p. 170). Employment is estimated by place of residence.
2 Fisheries & Oceans: Recreational statistical data.
3 Assuming 5.2 angler-hours per angler-boat trip (as per DFO 2000 Survey of recreational fishing).

Exhibit D-2 — DFO Management Areas



Source: http://www.pac.dfo-mpo.gc.ca/ops/fm/Areas/areamap_e.htm

Region	Adjacent Waters Defined by DFO Areas
Region #1	18, 19, 20, 21, 22, 23, 24
Region #2	28, 29
Region #3	11, 12, 13, 14, 15, 16, 17, 25, 26, 27
Region #4	6, 7, 8, 9, 10
Region #5	1, 2, 3, 4, 5

E. Industry Multipliers and Economic Measures Employed in the Study

E.1 Industry multipliers

Aquaculture (including processing)[1]

	Direct	Indirect	Induced[2]
Output	1.000	0.759	0.125
GDP	0.361	0.249	0.069
Government Revenues	0.066	0.037	0.016
Employment	3.104	3.718	1.113

Wild Salmon Processing[3]

	Direct	Indirect	Induced[2]
Output	1.000	0.560	0.134
GDP	0.312	0.191	0.073
Government Revenues	0.019	0.032	0.029
Employment	6.063	2.788	1.194

Salmon Sport Fishery[4]

	Direct	Indirect	Induced[2]
Output	1.000	0.522	0.295
GDP	0.503	0.250	0.164
Government Revenues	0.159	0.054	0.029
Employment	1.000	0.318	0.173

1 Source: 2001 BCIOM Industry Multipliers - Large Aggregation: Animal Aquaculture

2 Induced impacts assume that labour mobility is half way between the safety net and no-safety net scenarios

3 Source: 2001 BCIOM Industry Multipliers - Large Aggregation: Seafood Product Preparation and Packaging

4 Source: Tourism British Columbia "Economic Value of the Commercial Nature-Based Tourism Industry in British Columbia," Sept 2004

E.2 Economic measures

Salmon Farming

Wholesale value after processing	2005			1997
($ millions except employment)	Direct	Indirect	Induced	Direct
Output	371.1	281.7	46.4	189.5
GDP	134.0	92.4	25.6	
Government Revenues	24.5	13.7	5.9	
Employment (PY)	1,152	1,380	413	588

Wild Commercial Salmon Fishery

Wholesale value after processing	2005			1997
($ millions except employment)	Direct	Indirect	Induced	Direct
Output	215.5	120.7	28.9	312.2
GDP	67.2	41.2	15.7	
Government Revenues	4.1	6.8	6.1	
Employment (PY)	1,307	601	257	1,893

Salmon Sport Fishery

Revenues to the industry	2005		
($ millions except employment)	Direct	Indirect	Induced
Output	230.5	120.3	68.0
GDP	115.9	57.6	37.8
Government Revenues	36.6	12.4	6.7
Employment (PY)	1,983	631	343